JAN -2 1917

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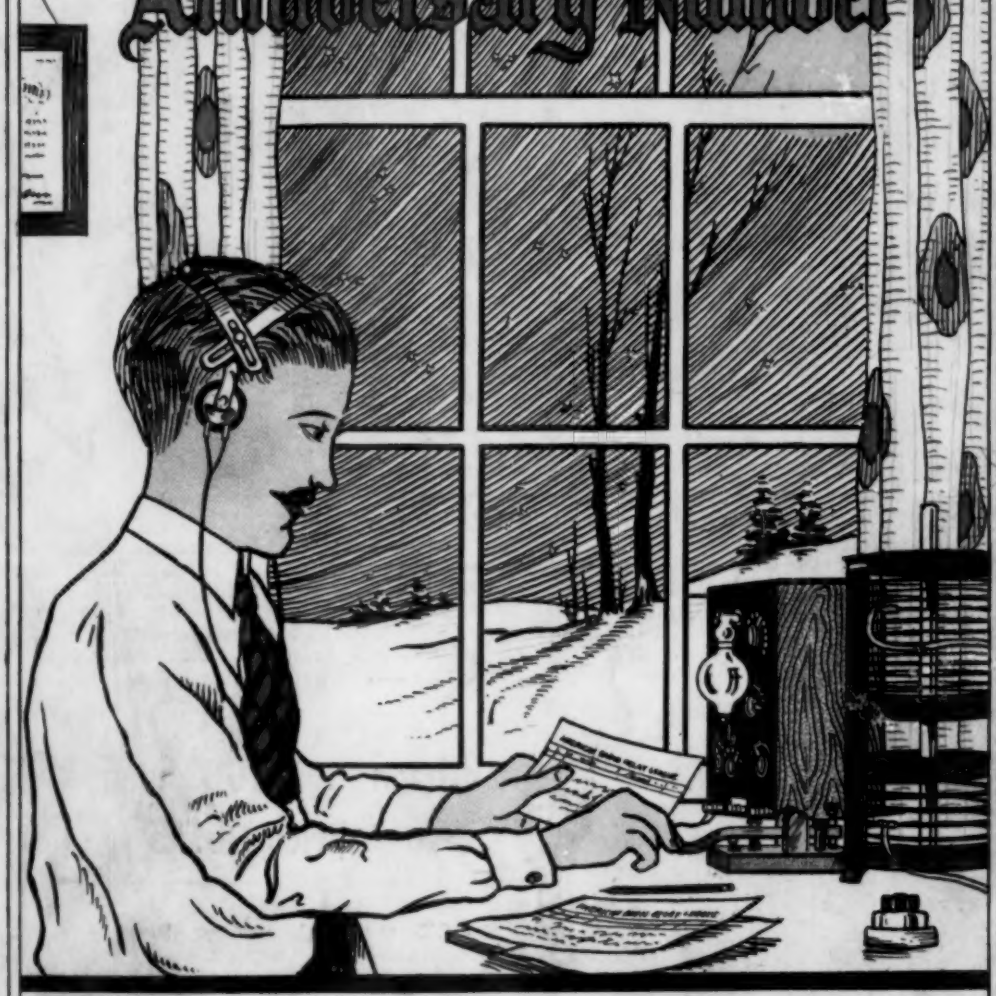

QST

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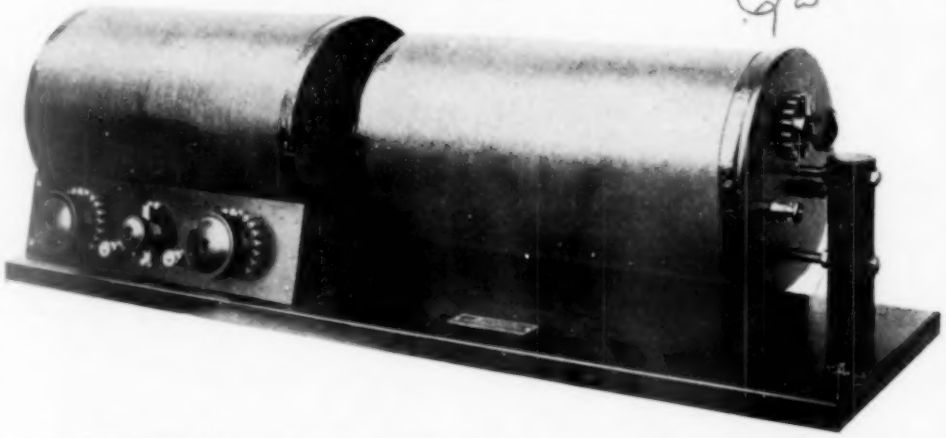

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QST

Volume II DECEMBER, 1916 No. 1

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THE QST PUBLISHING COMPANY, INC.
HARTFORD, CONN.

ALONE ON THE DEEP

The following verses were written by the mother of Seefred Brothers for Howard, the older, when he was in correspondence with Mr. Winser, who was at that time in the employ of Marconi Co. at San Francisco.

One day, as I sat in my station so fine,
Thinking of that dear little friend of mine
Who lives near the Bay where the waters roll
That often take a life for a toll,—
I seemed to see, as in a dream,
In the thoughts that through my brain did teem,
A ship at sea in a storm so grand,
With rudder broke and far from land!

And there was Winser on the deck—
The one remaining on the wreck,
Whence all had fled and left alone
With naught to hear but the ocean's moan;
For, while he sent the urgent call
Of "S. O. S," they, one and all,
Slipped in the boats and went away
To leave my gallant friend that day.

Then, as the ship was tossed about,
Drowning his voice if he chanced to shout,
The waters dashed and filled the hold,
They drenched his form and made him cold,
He threw up his arms as the waters rose,—
(My brother discovered me in a doze)
And a thunder-bolt must have hit the shed—
I was brought back to earth by a crack on the head!

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Q S T
A MAGAZINE DEVOTED EXCLUSIVELY TO THE AMATEUR

A Short Wave Regenerative Receiver

Complete Description with Instructions for Building

FOLLOWING the rapid growth of our relay work, there has come a continual and increasing demand for a receiver which would operate with efficiency and maximum sensitiveness on waves of less than 600 meters. It was required that the instrument be very selective. With the advent of the regenerative systems, there was room to design just such a set. At the present time, a number have been placed on the market employing tuners of altogether better design than was dreamed of among amateurs two years ago. It has been found that much of the efficiency was due to the care with which dead-ends were eliminated.

During the recent period of improvement, more than one of us began to feel that two receiving sets were necessary for the up-to-date amateur. One for relay work on short waves, the other for long wave spark and arc signals. With much completeness and care, Mr. Godley described in our August and September numbers, the design and operation of the regenerative system. Following all the latest kinks, the following set has been designed for short wave work.

It was first decided to have the audion circuit separate and individual, but on second consideration the audion was built into the set for convenience and efficiency. Fig. 1 shows a view of the complete instrument. This general layout may be improved upon and changed to suit conditions. One of the things worth noticing is that the complete set is mounted on a panel so that the panel may be drawn out of the case, bringing all the apparatus with it and opening it for inspection or repairs.

Fig 2 shows the back of the panel and the loose coupler, variables, etc., with the frame work on which the apparatus is supported. For the sake of clearness, the high voltage battery B, has not been shown, but it fits in the space outlined at B in Fig. 2.

The most important part of the set is the loose coupler. The primary consists of a cardboard tube 4½ inches in diameter and 1½ inches long. No size is given for the walls of the tube since this is a stock article. The secondary tube is 4 inches in diameter and 1¼ inches long. The secondary loading coil is 4 inches in diamter and 6 inches long. These three tubes should be boiled in paraffin to exclude all moisture and the possibility of warping. The primary is wound with thirty turns of No. 22 double cotton covered copper wire. Taps are taken out every turn for six turns and then every six turns making six taps for single turns and four taps with six turns each. The taps should be soldered and made as short as possible. The primary coil is fastened to the end of the frame upright C, by means of a wooden disc ¼ inches thick and of the right diameter. This completes the primary and it should be given a coat of thin shellac to hold the wires in place.

The secondary coil proper is built in a similar manner but wound with twenty-five turns of No. 26. No taps are taken off and the terminals are connected to two flexible inches long, wound with 100 turns of No. 26 double cotton covered wire. Taps are taken out from every ten turns, giving a total of ten taps, the first turn being con-

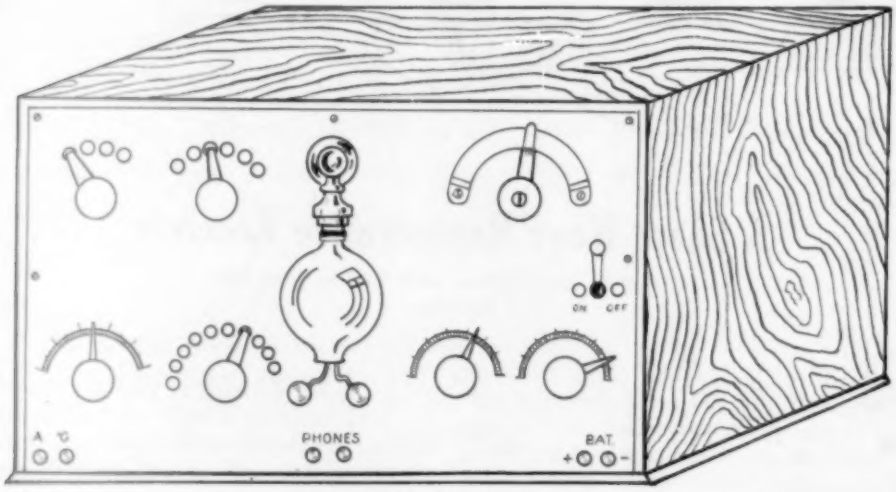


Figure 1

conductors to allow for the coupling which moves on arm E. A wooden disc is fitted into the end of the secondary on which arm E is fastened.

nected to the secondary proper as shown in the wiring diagram, Fig. 4. A connection is made between the last tap and the switch which acts as a reducer for the

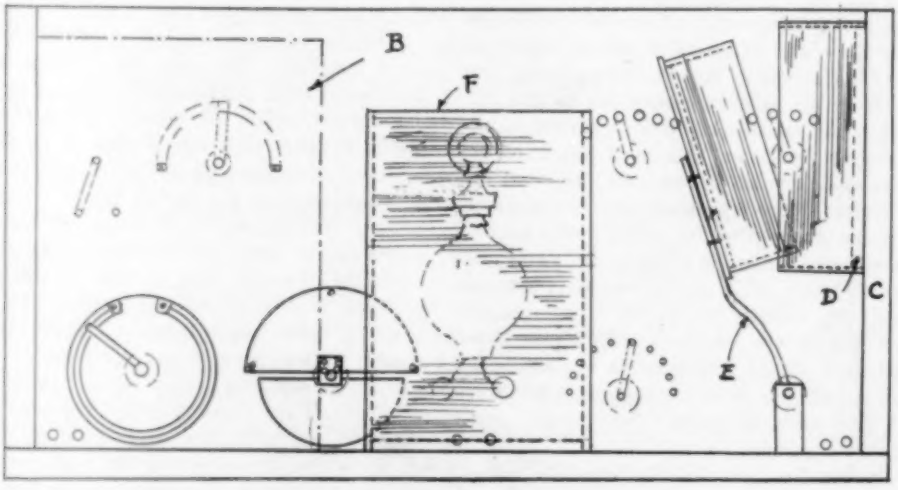


Figure 2

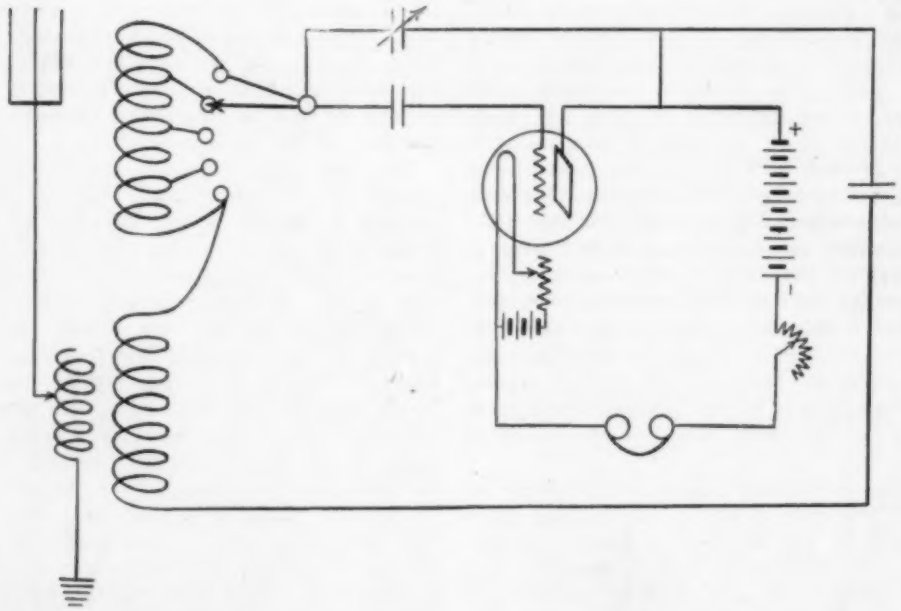
The secondary loading coil F, Fig 2, is placed at right angles to the secondary and primary to avoid undesirable inductive effects. Its size is 4 inches in diameter, 6

dead-end effect since it short-wave circuits the unused turns. One variable condenser is used to get the regenerative effect and this may be any of the small condensers

with about ten plates. The fixed condensers are about the size of a stopping condenser in the audion circuit. A piece of mica about 2 inches x 4 inches coated on each side with tinfoil gives the approximate capacity. A little experimenting will determine the exact size needed.

For adjusting the high voltage battery, a potentiometer has been shown. This is of the carbon resistance type such as is used on an RJ9 DeForest audion. With this circuit, either the tubular or round bulbs may be used with equal degree of success.

The apparatus may be mounted on a Bakelite or hard rubber panel. Figures may be stamped into the rubber and filled with a chalk and water mixture so that one will have no difficulty, with the proper tools, to label all the connections and switches. We have purposely withheld from giving in detail absolute and exact sizes and locations for switches, etc. This is to give opportunity for original work, and a chance to make the apparatus fit special conditions. Detailed operating instructions are not given since no two operators agree as to the best way to tune, but it is well to bear in mind one or two points: For example when working the regenerative system, it is always well to use less capacity than inductance. One also finds that the capacity of one's hand is enough to throw the set out, but after working with the apparatus awhile, one gets accustomed to this and it causes no trouble. We can promise that if one follows with care the dimensions of the loose coupler and circuit given, remarkable results can be had. Amplifications of from 25 to 100 are often obtained with a circuit of this type. Sets similar to this but not as complete are in use at the present time in several of the best amateur stations. Relay work has been done which would not have been attempted a year ago.



Efficient Short Wave Transmitting

By "Dr. Radio"

"Dr. Radio" hits the nail on the head in this article. Without elaborate mathematical juggling, he shows where some of our lost transmitting energy goes. The subject is discussed from a practical, operating standpoint. Every amateur operator will welcome "Efficient Short Wave Transmitting."—Editor.

EFFICIENT transmitting has nad less study from the amateur than efficient receiving. The reason is probably because many amateurs are satisfied to receive only. The time is rapidly approaching when there will be more attention given to the problems in transmitting. It is all right to develop apparatus which will enable distant ships and commercial stations to be read and it is nothing less than inspiring when the German stations, Japanese stations and South American stations are heard. But it is a more permanent form of satisfaction to actually hold communication with another amateur in a remotely distant state. The growth of the American Radio Relay League and the rapidly increasing number of its members who transact regular traffic over distances exceeding 1000 miles, is an indication of this. A study of the problems involved in long distance transmission with one kilowatt power input and a wave length of 200 meters, therefore becomes especially interesting at this time. The writer is pleased to present a general survey of the subject in this article. He hopes to follow it occasionally with different articles which will go into each different element in detail. An effort is made to avoid the mathematical and to confine the discussion to the simplest and most practical treatment from the standpoint of operation.

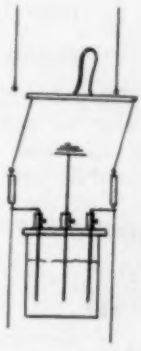
The Government limits the amateur to 1000 watts input and a transmitting wave length of 200 meters. It becomes necessary to secure the highest possible over all efficiency if long distance communication is to be attained. Transformer efficiency should be high in order to deliver to the condenser as large a percentage of the precious 1000 watts as possible. The condenser itself must deliver to the primary of the oscillation transformer a large percentage of the energy delivered to it. The oscillation transformer must be as economical in performing its functions. The antenna and its lead-in and its ground lead, must deliver the largest possible percentage of the power delivered to it in the form of radiation. The connecting conductors between each of these elements of a transmitting set must be almost free from losses. A knowledge of the nature of the different losses in each of the elements is not generally understood. In probably 95% of the stations in the American Radio Relay League, the writer would expect to find losses many times what is necessary on account of lack of practical knowledge on the part of the station owner.

The transformer should be the first thing considered in transmitting. If the full amount of energy is not delivered to its primary, we start out with a handicap. The Electric Light Companies usually require that a one kilowatt transformer be connected across the 220 volt circuit, or the outside of the three service wires. In the case of home made transformers which many amateurs depend upon, it is almost universal that some defect is allowed to creep in so that either the primary does not draw its full kilowatt from the service or else the efficiency in the transformer is very low. The latter can easily occur from the use of inferior iron in the core or poor construction. The building of a transformer to give the highest efficiency requires many

things which are only easily obtainable where quantity manufacture is done. Generally speaking it is better for the amateur to purchase a modern transformer from one of the recognized builders, than it is to make one. During the last year, great improvements have been made by the latter and very good efficiencies are obtainable. Many amateurs anxious to be identified in the long distance relay work, have found that with a good modern transformer they have been able to work distant points when before they had never been able to approach anything like long distance work.

But whether the transformer is home made, or professionally built, its owner should be sure that its primary input is one full kilowatt. Every watt counts and the measure should be over rather than under. It is not always enough to read the input by means of an ammeter placed in series. It is much better to use a wattmeter. Very few amateurs have the latter expensive instrument, but every Electric Light Company no doubt has, and most of them are perfectly willing to send a man with the instrument and make the measurement if they are asked to. The information is very helpful to the station owner, and moreover everything which will cultivate intimate relations with the Electric Light Company is always a good thing in these early days when amateurs are regarded as more of a nuisance than a profitable class of customers.

No station should ever attempt to operate on a power as high as one kilowatt without some form of kick-back preventer. Nothing will arouse the opposition of the Electric Light Company so much as bad burn outs around a wireless station. Moreover these burn outs are dangerous and can easily cause fire. A very simple expedient will prevent damage. Anything which will carry the high voltage surge to ground offers protection. Some people secure entire protection with high resistance carbon rods connected as shown in cut. The outside wires connect to ground through these carbon rods, which probably carry a small current all the time they are in circuit. If a surge occurs it goes to ground through the carbon rods, its voltage being high enough to find an easy path thereby. The main switch to the set should be beyond these rods so that when the station is left the switch can be opened and the small discharge through the rods cut off.



Another effective kick-back preventer is a small jar of distilled water and three aluminum wires immersed in it as shown in illustration. The outside service wires are connected to two of the aluminum wires and the ground is connected to the middle wire. Any surge has voltage enough to overcome the high resistance of the distilled water. The latter is necessary in order to avoid the salts, a small quantity of which is almost unavoidable in all natural waters, and would reduce the resistance between the aluminum wires. Distilled water can be easily made by condensing steam from the kitchen tea kettle or it can be purchased in the drug store.

Kick-back preventers containing capacity are used and can be made satisfactory. They cost more than the two forms described and are no better. Kick-back preventers can be purchased from some of the makers of radio apparatus for amateurs, at reasonable prices.

The voltage of the secondary of a transformer is a factor in the value of the station as a radiator. In order to make any calculations for condenser capacity and inductance, it is desirable to know the secondary voltage of a transformer. For the convenience of those station owners who wish to obtain the voltage of their transformers, the following jumping distances between needle points are given:—

Gap	Voltage
.225"	5000
.470	10000
.725	15000
1.000	20000
1.300	25000
1.625	30000

The above are in ordinary air.

The relation between transformer, condenser, voltage and spark frequency can be obtained from the following formula which should be used as a base, and from which each of the values may be obtained by equating:—

$$\text{Kilowatts} = \frac{\text{mfd} \times V^2 \times \text{spk. fq.}}{2^9}$$

For the benefit of those who do not resolve an equation frequently, it is pointed out that we can shift any of the above values in the place of "kilowatts," now that we know their relationships. For example, if we want to know the condenser capacity, the above formula transposed becomes,

$$\text{mfd} = \frac{2^9 \times \text{kilowatts}}{V^2 \times \text{spk. fq.}}$$

This leaves the equation in the most useful form since we can find the capacity needed knowing power, voltage, and spark frequency.

Every amateur has his personal convictions regarding the form of condenser best suited to his needs. The writer will not venture to discuss the advantages of photographic plates coated with tinfoil, molded condensers, nor Leyden jars. He will limit himself to some of the important things which influence losses no matter what form of condenser is used.

Ordinary glass dielectric shows losses amounting to between 2% and 8% of the energy involved. A compressed air condenser, in which the air is compressed to approximately 240 lbs. per square inch, has an extremely high efficiency. The losses are the lowest in any known construction, because air is the dielectric. Compressing the air increases its resistance. Atmospheric pressure would not do in a high tension air condenser.

If a Leyden jar is loaded to a point where it brushes, the loss is sometimes as high as 30%. A Leyden jar submerged entirely in oil is very efficient,—probably the most efficient construction short of compressed air. Jars are some times connected in parallel series in order to reduce the strain upon the glass, and avoid puncturing. Amateurs frequently think that this reduces brushing. If the capacity of the series parallel group is the same as the parallel group, the brushing losses are not diminished if the voltage is below 20,000 volts. Brushing has been found to be overcome by immersing only the edges of the metallic plating in oil, but the losses are not overcome nearly as well as when the jars are immersed fully. Measurements show that immersing the edges only gives about half as good results as immersing the jar completely. Brush losses grow rapidly if the glass around the edges of the metallic coatings is dirty or contains conducting or semi-conducting matter. These parts should be kept clean and dry in every condenser.

Amateurs suffer tremendous losses because of wrong condenser capacity and a lack of understanding of spark frequency and spark gap at their rotary gaps. Too much condenser prevents enough of a voltage rise to jump a wide gap and the spark frequency is not the number of studs multiplied by the r. p. m. of the motor, as would be expected. It must be understood where sixty cycle current is used, there are 120 phases per second only. The transformer secondary feeds the condenser by means of these 120 phases. The condenser must feed the spark gap anywhere from 500 to 1000 "phases" per second. (See illustration.)

Between each one of these the spark gap approximately completely discharges the

condenser. If the capacity of the latter is too great, it is obvious that there is not time for the pressure to rise high enough to jump before the next stud on the rotary arrives. Losses in many cases follow the use of too much condenser capacity causing too small inductance in oscillation transformer primary. The writer knows of stations using less than one turn of primary inductance. The transfer of energy across to the secondary in this case has very low efficiency, as things go in the usual amateur station. It would be better for an amateur to try less condenser and more turns in his primary. The point to be borne in mind is that the work done in charging a condenser is the number of times it is charged per second. This is expressed as follows:—

$$\text{Watts} = \frac{1}{2} \times \frac{\text{mfd} \times V^2}{10^6} \times \text{No. per Sec.}$$

Among the common losses in the oscillation transformer are those due to high frequency resistance. Many an amateur station heats the coils of the primary of its oscillation transformer so that immediately after sending, the coils are warm to the touch. This heat loss is of course prodigal. It means many miles less distance of transmission.

High frequency resistance is not fully appreciated by amateurs. It is well to give measurements which have been made. The resistance of a piece of No. 16 copper wire to a current having a frequency of 1,000,000 per second, is 6.5 times its steady resistance. Flat ribbons have immensely lower resistance than a piece of round wire whose cross-section is equal to that of the flat ribbon. Currents having wave lengths around 300 meters penetrate about .0025" into the surface of a copper conductor. In an iron conductor, they penetrate only .0005". The resistance to high frequency currents depends upon frequency. Short waves cause greater resistance than long waves and this represents another handicap the amateur struggles under with his 200 meter legal limit. It is not always easy to make the leads between condenser and spark gap and oscillation transformer and aerial switch short and of flat ribbon. Just the same, every amateur will improve his radiating power if he will study and experiment until he reaches a point where all his leads are reduced to the shortest possible limit and all of them are made of flat ribbon. He must never lose sight of the fact that he must have his conductor, through which his condenser is discharged, as nearly all in the form of oscillation transformer primary as possible. It is only by keeping this point in mind that he can use the largest possible condenser capacity and yet keep within the legal wave length limit.

Just so with his antenna and oscillation transformer secondary. His ground lead and his lead-in are all useless as radiators, relatively speaking. He must get everything possible into his antenna. This is where the biggest part of his capacity must be. His instruments should rest on the ground, if such a thing were possible, and his lead in should go straight up to his antenna. His oscillation transformer secondary should only have as few turns as necessary to insure good energy transfer.

In the matter of actual efficiencies which an amateur can expect in a transmitting set, we may be guided by values which have been obtained in certain tests. In one test Fleming made, he found that the power radiated from his antenna was 10% of that supplied to his transformer primary, and 20% of that supplied to his condenser.

Fessenden and Austin got 75% of the power delivered to their spark gap into their antenna, although this seems too good to be true. They also claimed that they delivered to their oscillation transformer primary 80% of the energy delivered to their transformer. This is something which the amateur may hold as his goal. He must work intelligently to even approach it, however. We are more inclined to believe that 60% overall efficiency is a remarkably good figure for the amateur, and even with this, we must bear in mind that the energy which the hot wire ammeter indicates is delivered to the antenna does not all go to radiation. Some is dissipated in heat, and some in inducing hysteresis in neighboring conductors.

This article is not complete without a reference to the much mooted question of

Continued on page 36

The First Trans-continental Relay

By Hiram Percy Maxim

SUPPOSE six or eight of us were to get our heads together and work up a plan to handle a message from some point on the Atlantic Coast to some point on the Pacific Coast, and get an answer back the same night? Would it not be something to be proud of in the years to come? Why not try it? We have had Trans-continental automobile trips and when the first car succeeded in making the long journey a few years back, it was hailed all over the country as a wonderful exploit. It certainly was that. Recently the American Bell Telephone Company carried on the first telephone conversation from coast to coast, and we are not yet through wondering at it. Those who figured in the undertaking will take their places in the future beside those hardy spirits who first succeeded in getting a signal over the first cable laid across the floor of the Atlantic. Just as great honor awaits those of us in our American Radio Relay League who successfully handle the first bona-fide relay message by radio across the Continent and receive an answer back the same night.

We have heard rumors that some one tried it last year, or intended to try it, or came near accomplishing it, but no positive evidence is at hand that it has yet been done. The chances are the first Trans-continental relay message has yet to be run, and it is a tremendous opportunity. There are not as many of these big things to do as there were a few years back.

The writer in his library in Hartford, Conn. on any good radio night hears amateur stations in Indiana, Ohio, and Michigan. These latter are heard working stations in Iowa, Nebraska and Kansas. These latter tell us in QST that they reach into Utah and Montana occasionally, and these in turn tell us they work stations in Washington, Oregon and California. Every day somebody adds something better in the way of transmitting and receiving equipment, and new stations also are springing up in the wide areas of the West where one would least expect it. Things are being done nightly right now, which were impossible this time last year. What is coming by this time next year, no man is bold enough to guess, for in no art being practiced today is advance so rapid as in amateur wireless telegraphy.

The writer has had a Trans-continental relay in mind for over a year, and he believes that we are just about arrived at the point where we stand a chance of running the first one through. It is true that it will require everything exactly right and careful pre-arrangement. This is no reason for criticism, however, because every first time had to have everything just right. After the way is blazed, things do not have to be so perfect, and it would be only repeating history to have Trans-continental messages handled regularly shortly after the pioneer effort has been made.

The practical way to handle this matter in our League, is to turn the detail arrangements over to our Trunk Line Managers, Messrs. Hebert, Matthews, and Seefred. They know the difficulty to be overcome, and in their skillful hands, success would be assured if success is a possibility. The writer has taken the matter up with these gentlemen and in the next issue of QST, he hopes to be able to give an outline of the plan to be followed. In the meantime, stations west of the Mississippi River can help by writing in such suggestions as they think will be helpful. Stations from three to five hundred miles in from the Pacific Coast and who are able to work some of the Coast amateurs are especially invited to communicate with us. Perhaps several have heard stations frequently which they have never worked. Where this is the case, let each drop the other a card and get together. This writing of cards and letters to stations we frequently hear, is always extremely helpful to all concerned in addition to being very pleasant. We make many friends this way, by radio, whom we would never otherwise know. Let us see what we can do and prepare to give all honor to those destined to be among the fortunate pioneers in handling the first Trans-continental radio relay message.

Rotten Ground-Leads

By "The Old Man"

"The Old Man" has found some more "Rotten Stuff" and this time it is truly "rotten." If there is any particular place to look for "rotten," it is certainly in a ground-lead. Let's begin to think of grounds the way the OM has. Next to the antenna the ground is the most important part of a wireless system. Perhaps it has been neglected, but the OM gives us a start in the right direction. By all means read the article. Editor.

WELL sir, I have found something else that can be rotten when it starts out to be. This is a ground-lead. Whoever suspected there was so much in a ground-lead. While I am waiting for the two little boys with the spark coils to get through asking each other how they come in, let me tell you about what happened the other evening at a certain Radio Club meeting.

The meeting started out to be very proper, and respectable. There was no bad QRN in the air and everybody seemed to be peaceful. About half way through the meeting, I noticed a little shriveled up chap in the back of the room sitting terribly stiff, with his neck run out as far as it would go, and otherwise indicating that he had a rush of brains to the head and would soon say something. You can always tell it before hand when a man has something on his chest in a meeting and is getting ready to unload it.

After a while he saw his chance. He opened up by asking this perfectly innocent looking question:— "What effect does the length of the ground-lead have on wave length?" Now I ask anyone if that is not a perfectly innocent question. But if any of you other bugs want to start something at a radio club meeting some night, just sit back in your chair and at the proper moment, ask this question. If your Club is like our Club, you will have a nice evening's entertainment.

In our Club we have the FINAL AUTHORITY on all radio matters. He settles everything. He knows all there is to know about radio-telegraphy. Decrement, capacity, resonance and temperature co-efficients are just ordinary bread and butter to him. He eats them alive. He was the natural one to answer this ground-lead question. He promulgated the ultimatum that the wave length was lengthened by lengthening the ground-lead. I thought this settled it. But it did not.

The little chap came back, "Where does a ground-lead begin?"

Final authority replied, "At your instruments of course."

"Where does a ground-lead end?" A pause followed this while Final Authority cleared his throat.

"Where you connect to your water pipe," was the answer given.

"Does it make no difference whereabouts on your water pipe you connect?"

"No." This was followed with a heavy pause. QRN and QRM stopped absolutely while everybody spent a few moments in thought. Finally from the little chap:

"What is the difference between a copper ground-lead and a water pipe filled with water and running into the earth?"

F. A. thought a moment and then delivered an oration which lasted some fifteen minutes and had to do with strain lines, capacities, natural periods, counterpoises, moist ground, etc., etc., but which fell a little flat after the first five minutes. After it was all over, the little chap was undismayed. He hopped on him again with this: "I'm trying to find out where my ground-lead ends. I am told it begins at the ground terminal on my loose coupler. I still cannot find out where it ends." Six or seven young gentlemen started to answer the question all at once. Fearing a riot, the Chairman rapped for order. F. A. took the floor and allowed in high-brow language that the ground-lead ended where it connected to the water pipe, since the latter

was a mere projection on the face of old Mother Earth.

"You say the ground-lead ends where the copper wire is attached to the water pipe. It makes a lot of difference in getting ten amperes into a 200 meter aerial and using 1 K. W. power. If the ground-lead and the lead-in are too long, I am in trouble. I want to find out where my ground-lead ends and the ground proper begins. Suppose my station is on the top of a hill. Does my ground-lead end in the same place?"

"Absolutely," from Final Authority.

"All right. Suppose I begin to dig away the earth at the base of the hill. Suppose I dig until the hill became a very sharp, steep hill. Would my ground-lead end at the water pipe?"

"Absolutely," but not so firmly from F. A.

"All right. Suppose I keep on digging away the earth and I finally get my house on the top of a pillar of earth and size of the house plan. Would my ground lead end at the water pipe?"

(Say boys, honest, can you beat this line of dope in your Club?)

"Sure it would." There was doubt on this point and another near-riot started. It was quelled and the little chap hopped in again.

"All right. Suppose I drive down more water pipes and arrange it so the house is supported by its water pipes. Then I dig out all the ground around the water pipes and leave the house standing up in the air on these pipes. Would my ground-lead end at the water pipe up in the air?"

Then the storm broke. F. A. had no show. Everybody talked at once and after the chairman had walloped the desk heartily for some moments, the little chap started things again by saying:— "I'm trying to find out where my ground-lead ends and where the ground begins."

Then another Richmond entered the field. This line of guff interests certain people. Said he: "It seems to me the ground-lead ends where the hot wire ammeter shows the maximum current. We all know the maximum current is at the ground terminal and the minimum current at the far end of the aerial. The maximum voltage on the other hand is reversed, and is at the far end of the aerial, while the minimum voltage is at the ground terminal. Therefore, if you ran along your ground-lead with a hot wire ammeter and found the place where the current no longer rose, you would have the point where your ground-lead ends."

(Say fellow bugs, how would you like to "run along" a ground-lead with a hot wire ammeter? Can't you see yourself down in the cellar amongst the old barrels, kindling wood and furnace dust, groping around in the dark putting a hot wire ammeter in your water pipe every now and again, and reading the current? I have a yellow photograph in my mind's eye of it going on in a certain cellar I am acquainted with.)

Said the Little One:— "Then in order to get the maximum possible radiating current into a 200 meter aerial, we must have a station down on the ground floor so that the ground-lead will be very short, and no more wave length wasted than is absolutely necessary?" But, I am still waiting for some kind friend to tell me just

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What's Coming!

where my ground-lead ends. I cannot put a hot wire ammeter in the water pipes of my particular cellar without first giving my father laughing gas and so I want to know whether it makes a difference to connect onto the water pipes up on the top floor of the house. If the water pipe brings the ground up to me in the attic, it is fine, because all my wire will be in the aerial and very little in lead-in or ground-lead."

F. A. had been chewing it over during all this. He delivered another oration, this time to the effect that the ground was determined by whether Hertzian waves went "through" or "followed the contour."

If these waves of "Old Man Hertz," as our friend Wolfe calls him, went through and came out on the other side, it was a ground-lead; but if the "old man's" waves followed the contour, then it was a hill and part of the ground. The Little One pointed the finger of scorn at this dope the same as he did about putting a hot wire meter in his father's water pipe. He allowed as how his shutter did not work quickly enough to catch the Hertzian waves out in his part of the town. He did not know any way to find out whether the waves went "through" or followed the contour."

It was about this time that one of the younger members tipped over backward in his chair and fell into the spittoon. The meeting lost its scientific value from then on, and—hello, they have signed off, and I will now see if I can raise old 8AEZ, and work off some of these "greetings by radio" msgs. which have been accumulating the past few nights. C. U. L. O.M. G. N. S. K.

Long Distance Receiving with Galena

By H. C. Seefred

THE object of this article is to show exactly what can be done on galena in long distance receiving work.

One evening, Friday, October 13th, as I was listening in, I noticed that signals from everywhere were rather strong, so I decided to stay up late and as it happened I stayed up until four the next morning. At 3:25 A. M. I heard JJC, a Japanese high powered radio station with high tone quench note on 3,000 meters, calling JOC, another station in Japan, with a "msg" for him, this distance being approximately 6,000 miles from Los Angeles. During the early part of that morning I had copied the NMA (U. S. S. Nebraska), off the Atlantic Coast over 2,000 miles from here working NAR. She came in good and on about 750 meters. I also heard KIE working with KET. Could read KIE six inches from the phones. In that evening and morning I heard NAA (Arlington), NAY (Cuba), WNU (New Orleans), KHK (Honolulu), KPA (Seattle), KPC (Astoria) NPE (North Head), VAK (Victoria), VAE (Estevan Point), VAD (Pachena, B. C.), NAJ, (Lake Park, Ill.), WUJ (Fort Sam, Houston, Tex.), and KDC (Douglas, Ariz.). This fall we also have been hearing KPX, KPM, NPW, NPI, XDA, NPF, VAG, and on a Poulsen tikker. We have heard KSS, KFS, KLS, KFZ, KSD, KHQ, NPL (using arc set), and several Federal boats. Heard KHX (Hawaiian Federal Station) rather faint, one night, working with KSS.

My brother listened in Saturday evening until four Sunday morning (October 15th) and heard nearly all the same stations I heard, including JJC, which he, too, got good.

As every-body thinks that Friday, the 13th is a hoodoo day and everybody has hard luck, I think we had pretty good luck that day.

Now, fellows, what's the matter with galena? Nearly as good as an audion, eh!

Million Dollar Wireless Suit

Marconi Company Demands Million Dollars Damages From the United States Government

THE Marconi Wireless Telegraph Company of America has filed a petition in the Court of Claims, making charges that the United States Government, through its Army and Navy Departments, its Agricultural and other Departments, has manufactured, or constructed, or used apparatuses in violation of the patent rights of the Marconi Wireless Telegraph Company of America. The claims for damages amount to $1,000,000, which have been entered by the American Marconi Company in the Court of Claims.

The patents named as having been infringed are the re-issues No. 11,913, granted to Mr. Marconi on June 4, 1901, for transmitting electrical impulses and wireless signals and the apparatus therefor; patent No. 609,154, dated August 16, 1898, and granted to Sir Oliver J. Lodge also for inventions in electric and wireless telegraphy; the important tuning patent of Mr. Marconi, No. 763,772, of June 28, 1904; and patent No. 803,864 granted to John A. Fleming on November 7, 1905, being for an instrument for converting alternating electrical currents into continuous currents. This patent is called the "valve-detector."

The Marconi Wireless Telegraph Company of America alleges that in violation of its rights and privileges, as owners of these patents, the United States, through its officials, officers, engineers and agents, has, ever since June 25, 1910,entered into contracts and agreements with various persons, individuals and corporations, for furnishing wireless instruments and apparatuses, which constitute infringements of the above-named Marconi patents, and that the Government has used, employed and is still using and employing instruments and apparatuses so procured and obtained and has contracted therefor. The parties specifically mentioned in the petition filed with Court of Claims are Fritz Lowenstein, Emil J. Simon, the Telefunken Wireless Telegraph Company, The Atlantic Communication Company, Messrs. Kilbourne & Clark Company, and The Wireless Specialty Apparatus Company.

The Marconi Wireless Telegraph Company of America proposes to substantiate and will substantiate all its claims for loss of sales and contracts and for such damages, and will adduce evidence that it has at all times been anxious, ready, able and willing to furnish and supply to the United States Government and any of its departments any of the instruments and apparatuses manufactured under its inventions and letters patent, and charge only reasonable prices therefor.

The petition to theC ourt of Claims also states that immediately upon learning of the infringements the Marconi Wireless Telegraph Company of America notified and warned the United States Government and all its various departments using infringed patents, instruments and apparatuses to desist from such use, but that the United States Government "neglected and refused so to do, and still continues to make and use the inventions set forth and claimed in said letters patent."

Mr. E. J. McNally, Vice-President and General Manager of the Marconi Wireless Telegraph Company of America, states that the Government, "well knowing that the validity of said letters patent had been adjudicated in favor of your petitioner by several of the courts of the United States, has, since the twenty-fifth day of June, 1910, and before the filing of this petition, without license of your petitioners, and without lawful right, made and constructed and used a very large amount of apparatus containing

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Juice

By Experience

ANY real wireless station must have juice of some kind and it is here where the first puzzling problem enters the amateurs' field.

In the earliest beginning, man usually tries to draw juice from dry cells. With a very limited amount of experience he soon discovers that juice doesn't need to be drawn—it accommodatingly bursts out and runs down the sides, but only to the bottom when there is something worth spoiling there. About this time, having grown much older by experience, it dawns upon him that dry batteries are only built to throw at cats and other pests. How well I remember the time when a battery served me faithfully. I was trying to receive unreceivable signals in my shack located in a certain back-yard. An old Tom commenced vocal exercises with a young lady cat. I came out and asked in my politest tone to kindly stop, but they paid not the slightest bit of considerate attention, so I gave them QRM. Still they kept on and not wishing to abruptly disturb Tom's peace of mind, I took one of my convenient dry cells and removed a perfectly good board fence from under the young lady. The gallant Tom seemed to be having QRL and he could not understand, so I took another battery, removing his fence-board also. Batteries are useful occasionally.

Next in the field, is the interrupter. An electrolytic can also serve its purpose. Some amateurs have occasionally found it useful in sending. I was never this fortunate. My first message sent with an interrupter was faintly received with great rejoicing by a fellow ham, almost half a block away. He said it came in with a rather dull sound, though, and after a proper amount of Sherlock Holmes work, we deduced that he had heard a plumber pounding in the basement.

But the real use for an interrupter is this: One of our most neighborly neighbors had a long pedigree attached to what they called a dog, but what came nearer to being what is commonly known as a pole-cat, sometimes called a skunk. It had a habit of digging under the same fence which was shocked with my batteries and absorbing groceries and milk left on our back-steps by a thoughtful member of the A. P. C. D. A. (Association for the Prevention of Cruelty to Dumb Animals). Perhaps out East, you call them, delivery boys. Of course we didn't mind feeding our neighbor's dog, but even at times this became inconvenient, and at last I decided to say goodby to the long-haired purp. Now here's where you use the interrupter. It saved me a great deal of trouble. After a spell of idleness, I took the lid of the so-called electrolytic and put it outside the shack. Now it came to pass that our cook ordered some dried fruit from the grocery and the purp becoming thirsty after eating this, walked over and drained the acid from the interrupter. Interrupters do good work sometimes.

Following the interrupter, a transformer is the natural result. This, of course, brings with it city juice, which, you understand, is usually designed for lighting purposes, but after the Light Company installs it who cares if you unearth your new transformer from the closet, sell your coil and interrupter, and get acquainted with the city generators? Surely not the Company. Then comes real juice. Juice enough to gladden the heart of any amateur. Delicious juice? Thirty-two amps flowing through the primary. (Not more, because that was all the most encouraging pull could yank from the line). Juice jumping everywhere, from the table to the line, from the line to the phones, and from the switch to your knee!

Ah, those were the good old days!

But, seriously now, fellow bugs, don't you think it is foolish to draw unnecessary juice from the lighting circuits? Lighting Companies are like detectors; they must be handled with care. One amateur getting

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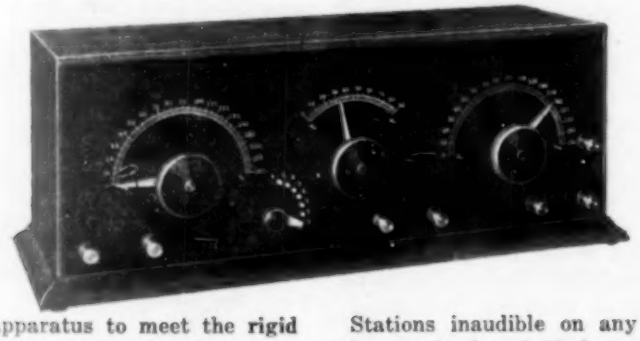
Perfecting Apparatus

WHEN the radio amateur first came into being a good many years ago, the remarkable possibilities of wireless were still only a matter of speculation. He, being not at all the least imaginative of his fellows, dreamed many wonderful dreams the most persistent of which was the wondrous dream of unlimited communication. Day or night, summer or winter, no matter when, he easily engaged in conversation with his friends many miles away. Relay messages flashed from coast to coast and from border to border without a hitch.

At that time, it was of course, only a dream—but now, it is a dream come true. The refinement of the audion detector—the discovery of new methods of applying it—the advent of the wonderful amplifying circuits and last, but by no means least—



the design of apparatus to meet the rigid requirements of these have made this phantom of the imagination a REALITY.

The ilustration shows a new instrument which materializes those wildest fancies. It is the Paragon Type RA-6 Amplifying Receiver. And "Paragon" is a well chosen word for "Paragon" means "a perfect example of excellence." It has set a new standard for amateur radio equipment. It merits all the best that can be said. There has evidently been no effort to save materials or labor but only a desire to produce the best. Never before has any amateur radio apparatus incorporated so many painstaking refinements or been developed to such an unusual efficiency. Nearly two solid years of patient effort have been expended in its perfection.

It has been designed for amateur waves only—an increase in its range would result in a sure decrease in its marvelous efficiency.

The Audion detector is a voltage operated detector. Capacity in the circuits lowers the effective voltage and is undesirable. The distributed capacity of the coils has here been reduced to a minimum and there are no variable capacities for tuning—INDUCTANCE COILS ONLY are used and these are of the continuously variable type (properly designed variometer). Switches with their inevitable resistance are unnecessary. The use of variometer inductances does away with all end-turn effects.

Antenna coupling is inductive and variable.. It is hardly necessary to dwell on the necessity for loose coupling where selectivity is desirable.

Stations inaudible on any ordinary circuit may be heard 10 feet away from the telephones. The amplification possible ranges from 25—80 times using one audion only.

The workmanship is perfect. All materials are of the very highest grade. The cabinet is a strong, weathered, quartered oak case fitted with a hard rubber panel, uarge scales and two-inch knurled hard rubber knobs. All metal parts are brass, finished in gold lacquer. The exceptional beauty and finish of the instrument go hand in hand with its perfection. The price is well within the reach of the average amateur. Credit must be given the Adam Morgan Company for producing this exceptionally fine piece of apparatus.

MONTHLY REPORT OF TRUNK LINES "C" AND "D"

A. A. Hebert, Manager

Routes of Lines "C" and "D" having been reprinted in the October number, bringing the routes up to date, future changes should be based on that number, and should it be necessary to make changes in the future, a reprint would undoubtedly be made. As the routes now stand they cover the territory well, and our principal object now is to make all the stations efficient.

Test messages have been discontinued owing to strong interference by non-members who insist, and in some instances by members who seem to take delight, in calling the 8th and 9th District Stations as soon as they hear some of our stations working.

Your Manager makes a strong plea to those stations in the vicinity of New York to please "stand by" when such stations as 2LK, 2ABG, 2IB, 2IM and 2ZP are working the Western Stations, as they usually have traffic to clear, and any one putting themselves in their position will know how exasperating it is to be interfered with.

Very fine long distance relay work is being done by 2LK, located at Valley Stream, Long Island and his work with 9IK is to be commended; as a matter of fact the other four stations mentioned above are taking care of all the relay work East and West.

The same unfortunate condition exists on Line "C" between Philadelphia and Washington, and so far we do not seem to be able to receive any encouragement that the situation is changing—it certainly seems that some of our good members in those two cities and intermediate ones ought to co-operate with the view of establishing constant communication between the two points mentioned. From what we can hear more time is spent in trying to work direct with stations in the 8th or 9th District instead of developing nearby transmission. Members ought to realize that unless we all co-operate we cannot expect to accomplish much or attain the purpose we have in mind, and that is to be able to relay to all our stations.

Please note that Branch No. 2 runs from Philadelphia to Atlantic City, and the following stations are appointed to take care of the traffic:

PHILADELPHIA, Pa.
3AEP—James F. Rau.
COLLINGSWOOD, N. J.
3NM—Geo. E. Haldeman.
ATLANTIC CITY, N. J.
3IF—Earle Godfrey.

The following changes should be noted:

Line "C"

TRENTON, N. J.
3MC, Martin K. Pillsbury
3VG, Mac Applegate.
VALLEY STREAM, N. Y.
2LK, J. O. Smith.

Line "D"

BETHLEHEM, Pa.
3GC, Bethlehem Preparatory School
BRIDGEPORT, Ohio.
8NT
NEW ORLEANS, La.
5AV, Wm. Macke.
COVINGTON, La.
Official call of St. Paul's College is 5EQ.

In closing I desire to express my deep appreciation to all members who have been communicating with me and who are trying so hard to develop the League and its routes. District Supt. Cooper, of Jacksonville, Fla. is working very hard, and from reports will have Georgia and Florida in fine working condition probably by the time this goes to press. District Supt. Gravely of Danville, Va. reports very favorable progress in his District, and if

the interest keeps up there is no doubt of our being able to work through to Key West, Fla. on Line "C" if we can bridge between Philadelphia and Washington.

A. A. Hebert,
246 Highfield Lane,
Nutley, N. J.

oo

TEST MESSAGES ON WESTERN TRUNK LINES

Up to the present time six test messages have been sent out by Seefred Bros. on different dates and considerable progress is to be noted in the way in which the tests are put through, but as yet we have not succeeded in getting beyond the State boundary with them.

The first test was on the evening of Saturday, October 7th, immediately after the ten P. M. time and weather reports. After three hours hard work through QRM this message was received and acknowledged by 6BJ (Centerville), 6SC (San Francisco), 6BY (Richmond) and 6PN (Acampo). Attempts were made to get it through to KDP and 7ZH but without result.

After noting the great difficulties in handling the test on this occasion, due to excessive interference, it was decided to send them in future on Thursday nights, when the children and spark coil "hams" are tucked up in bed. This change made a marked difference in the handling of the second test, sent on Thursday evening, October 19th, but its receipt was limited to practically the same stations as the first.

The following test messages were handled in almost the same way with the exception of the last on Sunday evening (which has also been made a test night) Nov. 5th when 6ZW at Bakersfield got on the job for a test for the first time. On this night none of the fellows north staid on the job for the test, but it was received by 6 ZW from 6EA on the first transmission and then relayed direct to 6SR and 6RG in San Diego, rather a roundabout route but the only way that it could be put through. This makes the first time that a test has reached San Diego.

Great credit is due the work of Mr. Bunting at 6BJ, who has taken nearly every message direct from 6EA and relayed it to the Frisco fellows, making a strong and reliable link over a bad gap. 6ZW will be on regularly from this time and will add considerably to the trimming up and filling in of trunk line "F."

(Signed) Seefred Bros.,
Managers "B" and "F"

oo

NAVAL RADIO AND THE WESTERN AMATEURS

Early in October a circular letter was sent to the leading amateur operators along the coast by Lieut. J. M. Ashley, District Communication Superintendent at NPL, announcing that on Saturday, October 7th, soon after the time signals, two messages would be sent out from NPL on 750 and 1900 meters respectively and requesting that all amateurs copy these messages and mail them in at once to the Naval Radio Station at Point Loma, the object being "to determine results obtainable with amateur stations." The text of the messages, as received by amateurs as far north as Sacramento, Cal., follows:

No. 1

"Amateurs, Amateurs, Amateurs—For the benefit of the Nation at large and in order to increase the efficiency of the Radio Service co-operation of all amateurs is requested—Sig. NPL."

No. 2

"Amateurs, Amateurs, Amateurs—All things come to him who waits, but time, tide and radio wait for no man—Sig NPL"

oo

REPORT OF TRUNK LINES "B" AND "F"

The Relay Lineup

Hereafter our test messages will be sent out from Los Angeles on every Thursday and Sunday night at 10:15 P. M. until further notice. We want all our relayers to

please try and be on the job as we have had a little trouble when some of the operators have not been "on."

The following shows the latest lineup:

Trunk Line B

PORTLAND, Ore.
KDP and 7JH
LA GRANDE, Ore.
7ZH
BOISE, IDAHO
7CE
?
SALT LAKE CITY, Utah
6 ZI, 6ZV, and 6SL
VICTOR, COLO.
KIW
DENVER, COLO.
KIX
?
?
LINCOLN, Neb.
9RB and 9AHR
SAINT JOSEPH, Mo.
9HU
LEAVENWORTH, Kans.
(FJ)
TOPEKA, Kans.
pQV and 9JW
LAWRENCE, Kans.
9LQ and 9XP
KANSAS CITY, Mo.
9XK, 9MQ, 9EP, and 9LO.
CAPE GIRARDEAU, Mo.
9NN

Trunk Line F

SAN DIEGO, Cal.
6SR
POMONA, CAL.
6AAG
LOS ANGELES, Cal.
6EA
BAKERSFIELD, Cal.
6ZW
FRESNO, Cal.
(6RD) and 6QL
CENTERVILLE, Cal.
6BJ
SAN FRANCISCO, Cal.
6SC
BERKELEY, Cal.
6WL and 6JZ
RICHMOND, Cal.
6BY
STOCKTON, Cal.
6SH
LODI, Cal.
(JS)
ACAMPO, Cal.
6PN
IONE, Cal.
6RJ
SACRAMENTO, Cal.
(no official call yet)
RENO, Nev.
6AV
?
?
PORTLAND, Ore.
KDP and 7JH
LACEY, Wash.
7YS
HOQUIAM, Wash.
7DJ
SEATTLE, Wash.
7BS
?

We would be pleased to hear from anyone who could fill in the places marked (?).

Mr. S. Kruse (9LQ) of Lawrence, Kansas, was appointed as Local Manager to help develop that end of Trunk Line B.

Seefred Bros., Managers,
343 So. Fremont Ave.,
Los Angeles, Cal. 6EA.

oo

REPORT OF TRUNK LINES "A" AND "E"

I wish to call attention to several mistakes made in recent issues of QST. In the report in the October issue, the statement is made that 9XN is in Fargo, N. D. This should read Grand Forks, N. D. In my November report, the station at Houston, Texas is not 5EO, but 5ED, and its owner is Mr. J. L. Autry, Jr. In the same report, in Branch No. 1, the station at Kenosha is not 9BK, but 9VK, and that at Milwaukee is 9ADL, and not 9AOL. At several points in the report, 9GV is mentioned as being heard at 8SK and other places. These should read 9GY. The following route is substituted as No. 4.

CHICAGO, Ill.
9IK R. H. G. Mathews
MAYWOOD, Ill.
9AU R. Iverson.

Station 8QJ at Detroit has been added to Branch 16 from 8NH. Mrs. Candler reports that she is working hard to bring her branch routes up to efficiency, as these routes are important.

The bi-weekly test messages have been sent out regularly by 9IK and 9EF, and some very gratifying results have been obtained and some freak records made. The test message of Nov. 2 was copied by every station on Route A east of Chicago, with one exception. 1ZF reports 9IK signals OSA on this message as does 2AGJ.

Route E is coming along now, and is doing some good work at last, altho all its stations are not yet working. Station 5ED, at Houston is doing exceptionally good work, being heard at and working with 9IK regularly, altho he is at the extremity of Route E, 1,100 miles from Chicago. Stations are needed to connect this station with the Pacific Coast and any applicants will be welcomed by both Mr. Autry and myself.

All the stations on my routes, either Trunk or Branch, are requested to send me a list of all the long distance amateur stations which they hear during the month, for publication in this report. Such lists must be at 9IK by the Third of every month to get into the next issue of QST.

The following are the lists of stations heard at various Trunk Line stations during October.

Heard at 8NH, St. Marys, Ohio

1ZD, 1IZ, 1VN, 2DA, 2RI, 2JU, 2JD, 2BM, 2 IM, 2ABG, 2ZB, 2PM, 3TQ, 3SZ, 3ZS, Dr. J. G. Hudson, Wilmington, Dal., 4DG, 4AR, 4CL, 4AA, 5DU, 5BV, 5ZD, 5BB, 5AP, 5AA, 5DI, 5ZC, 7ZC, 8KF, 8ADB, 8GZ, 8JA, 8XA, 8VP, 8AEH, 8AAK, 8VX, 8ADE, 9YO, 9IK, 9HX, 9EP, 9QL, 9LR, 9NU, 9IG, 9UC, 9ME, 9HQ, 9XR, 9DK, 9FP, 9RP, 9FY, 9XL, 9AIM, 9TR, 9PI, 9EM, 9RD, 9AAG, 9XN, 9ZL, 9HU, 9YE, 9LO, 9AP, 9PF, 9HS, 9JW, 9VP, WS, MSK, JOI, RCM, GP, KNO.

Record communicating distance covered by 8NH during the month of October was 1,100 miles. This work was done with the SS Freida plying between Key West, and Sabine, Texas, on the Gulf of Mexico. Tests were made at different times during the trip, and the signals of 8NH were always reported at QSA. 8NH used an input of 575 watts during the tests, and the SS Freida used three-quarters of a kilowatt. A. H. Grebe's special short wave receiving set was used on the Freida, while a single audion was used at 8NH.

Heard at 9IK, Chicago, Ill: 2LK, 2AGJ, 2PM, 4CL, 5DU, 5BV, 5ED, 8OH, 8AEZ, 8CS, 8NH, 8JX, 8PA, 8AOF, 8AOR, 8AOI, 8NQ, 8NF, 8JZ, 8ADE, 8SK, 8AAK, 8XA, 9JI, 9ABD, 9GY, 9NW, 9EG, 9EP, 9VP, 9AIV, 9QG, 9ZL, 9GJ, 9WF, 9ACM, 9NU, 9VK, 9DB, 9ADL, 9DS, 9XR, 9ZS, 9ACE, 9VY, 9HQ, 9XN, 9RD, 9FY, 1VN. During the month of October 9IK was reported as being QSA by 1ZF, 2IM, 2PM, 2AGJ, 3ZS, 3FS, 5BV, 5ED and 2LK. The record transmitting distance for October was made with 5ED, at Houston, Texas, 1,100 miles from Chicago, with whom 9IK worked for an hour, both stations reporting the other QSA. Excellent transmission of messages was also done with 2AGJ.

Heard at 1ZF, Fall River, Mass. (Only stations beyond first radio district are listed here). 9VY, 9NU, 9EG, 9ACA, 9XE, 9JZ, 9JI, 9TA, 9HQ, 9AEU, 9IK, 9ABD, 9ON. Record receiving distances during this month are 9AEU and 9ABD.

Station 9FW at Cairo reports 9NN, 9GY, 9IK and 8NH all QSA in relay message of Nov. 2.

Heard at 8JZ, Cleveland, Ohio: 2AGJ, 2JD, 2LK, 2IM, 2DA, 2ZB, 4DG, 5DU, 5ZC, 8NH, 8AEZ, 8PA, 8AF, 8LS, 8JA, 8VP, 8UM, 8JD, 8LE, 8JX, 8CO, 8CX, 8YI, 8YL, 8XA, 8AAD, 8YO, 9IK, 8OS, 8AOI, 8AKM, 8AIM. Record transmitting distance for the month is to 2AGJ, at Albany, N. Y.

During this month, 9GY at Mattoon has worked with 2AGJ, 5BV, 5DU, 5ED.

Mr. K. B. Warner, of Cairo, Ill. has dismantled his set at 9JT and has entered into a partnership with 9FW. The relay work for that vicinity, including test messages will be handled by Mr. Warner at 9FW henceforth. Mr. Warner will use the personal signature BT when operating at 9FW, to distinguish him from Mr. Moreland.

Continued on Page 40

QST'S FIRST BIRTHDAY

Well, wireless amateurs of America, our QST is one year old this number. Just twelve months ago, it was decided at Hartford headquarters of the American Radio Relay League, that the membership throughout the country would support an amateur wireless magazine. There was some who shook their heads but there was a certain one who firmly believed it. He now has the great pleasure of using the ancient quotation, "I told you so." Not only has the magazine been supported but the support has been sufficient to enable us to enlarge it and undertake expenses which seemed serious in the beginning. We have put some paint on the outside cover, we have increased the number of illustrations and we have added to the number of pages almost every month; and what is more, we have been able to advertise our magazine in other magazines.

Now don't let any one run away with the notion that this vigorous growth has been automatic. It has not. We had nothing but a straight mineral detector. No amplifiers, no regenerative circuits, and no microphone multipliers, were used on our circulation. We used good single distilled water white elbow grease and plenty of it, and this was all operated with high efficiency and small losses by the encouragement and support of you good fellows throughout the country. We certainly can congratulate each other.

Our first QST was a little bulletin, although we thought it was pretty hot stuff when it first came out. You fellows were very polite in your comments. We now direct your attention to the present number of this same QST. Listen to the sound of the spark through the reading matter and then put your hot wire meter on the advertising. It only shows what strength and possibilities there are in mutual cooperation. We thank you, fellow enthusiasts, for your help and encouragement during the past year. The work has been hard but it has been pleasant. We have enjoyed it thoroughly.

A. R. R. L. TRANS-CONTINENTAL RELAY

These are busy days. We no sooner catch our breath after the tests between the amateurs and the different naval radio districts than along comes a thrilling possibility of figuring in a Trans-continental relay. Our President's article on another page, starts the red blood coursing in our veins, and we are sorely tempted to fling this typewriter out the window and get into the game. There is something distinctly appealing in this business of being one of the PIONEERS in the FIRST AMERICAN TRANS-CONTINENTAL AMATEUR RADIO RELAY. Every one should read every word of Mr. Maxim's interesting article. The fellows out West will be looked to for the big work. Here's encouragement to them.

LEAGUE DUES

The question of dues in our League is one which has bothered us here at Headquarters for a long time. Of course the policy of our League from the start has been to keep away from anything like money making. The organizers intended the scheme should be strictly a "gentleman's arrangement." They preferred that it should lose money rather than make money.

That this policy was a wise one, time has proven to be true. Since we amateurs organized our mutual League, we have been copied by several. But not one of them but had some kind of a money making axe to grind. Not one of them has been as successful as we have been. When we come to this business of annual dues from the members, we therefore feel hesitant. We would not be maintaining the brotherly spirit of the early days unless we did. Just the same it costs us money to buy postage stamps, letter heads, envelopes, typewriter ribbons and the help that has come to be absolutely necessary, owing to the growing membership. This money has to be raised by donations from those who happen to combine true sportsman's instinct and a little surplus cash. We have derived a little income from getting out a call book, but it never amounted to much because of the expense being great for this class of work. The work of the Secretary has always been given gratis, but no matter how willing the flesh may be, there are only twenty-four hours in the days here in Hartford, and QST requires a good share of them. To handle the League work, it has required employing an assistant, and like other assistants, ours has to be paid every Saturday night.

If we have regular annual dues, say of $1.00, and the membership will pay them, it would be an easy matter. Many members write in and offer to pay dues and we have always entered them up for the year and sent them their membership certificate, call book, and bundle of message blanks. But those who have not come forward have not been urged. It costs money to do this urging, and we have also disliked to do it. But now, a good many of us feel we ought to urge the payment of annual dues in order to carry on the good work the American Radio Relay League is doing and can do in the future. Probably it is right. Therefore, let every one who reads these lines be advised that membership dues are expected and that they amount to $1.00 a year. Any one sending in their dollar now is paid up until December 31st, 1917. In exchange for these dues, we will send out certificates of membership and a quantity of League message blanks. The money will be distributed between Headquarters and our three Trunk Lines Headquarters. Mr. Hebert at Nutley, N. J., Mr. Matthews at Chicago, Ills., and Seefred Bros., at Los Angeles, Calif. have and are now paying for their postage, printing and expenses out of their own pockets, and we all owe these gentlemen a debt of appreciation for the true sportsman's instinct they have shown. They have had a lot of work to do, and quite a little money had to be spent by them. Not one of them has ever even suggested any hesitancy and it certainly is a fine example of the radio enthusiasm and efficiency which our American Radio Relay League possesses.

Between now and January 1st, we hope all those who are members and have not already paid their dues for the coming year, will send in their dollar and of course all of those amateurs who are not members, should apply for membership, using the blank which is printed in QST.

FREE ADVERTISING

Some times we think that all the QRM of the U. S. A. is added together and multiplied by 3.1416 times the radius in which QST operates, and concentrated in the enlarged box which we call Our Office. We cannot read all the signals distinctly, but we detect one high pitch which says something about our giving free advertising. It raises a nice point which we want to come out upon good and plain.

We editors of QST know something about radio engineering. We realize there is a lot we do not know, but when we know we know, we are not afraid to go up as high as five kilowatts. Therefore we may be understood when we say that we are not afraid to say what we think, especially if there is a chance that we might help a few thousand other amateurs like ourselves. If we know a piece of apparatus is good, we are not going to hesitate to say so, and tell the name of the maker and give a street number and city. The better this apparatus is, the stronger we shall say so. We do not propose to show any prejudice based upon commercial acquaintance, patents or friendship. Every amateur who really wants to increase his efficiency, wants to hear about new apparatus which is good. If a manufacturer shows us he has brought out a piece of apparatus which is good, we are going to print the facts in big type whether it advertises him freely or not. So, don't be excited, friends, if you see names and addresses mentioned in the columns of QST in a perfectly open and barefaced manner.

QST'S "HOW TO MAKE IT"

So far, we have kept out of the field of "How to make it." It always seemed a little too young for us. There is however, a want which is not entirely filled. For example, some of the new regenerative sets can be built the same as we sometimes build ourselves a loose coupler or an audion box. To meet this want, we propose to begin a department which we shall call "OUR CONSTRUCTION DEPARTMENT." Not only does this sound a little better than "How to make it," but it is to be better than anything else of its kind yet done. We propose to frequently have a good article on some important apparatus which will improve relaying and enable some of us to learn something. In this issue, we begin with a small but efficient short wave regenerative receiver. We shall have others from time to time. If you want to know how to build something good, write us and we will have a high grade article prepared covering the subject.

THE SUBSCRIPTION CONTEST

We are feeling quite chesty about that first Subscription Contest of ours. It was fine. We only have one regret, and that is, that the contest did not run long enough to give every one a better chance. We shall have to start another one because it helps many fellows obtain apparatus of a quality which they could not otherwise secure. It is easy for many to supply hard work but very difficult to supply money. We can turn the hard work into money equivalent, by means of these contests.

We have thought of a new kind of a contest which will also help all concerned. This one will be for Radio Clubs. We can remember a few years ago, when our Radio Club wanted a wave meter. The trouble was, an appalling lack of cash. We had to abandon the idea. In those days there was no QST to help us. QST is now going to give every Radio Club in the country a chance to get the best wave meter that can be produced. Take a look at another column in this issue, and read the announcement. If your Radio Club has the real stuff in it, it can have the wave meter problem solved in sixty days.

WHEN QST GOES TO PRESS

When QST goes to press, we feel like the chap who runs all the way home to hear the NAA time signals and arrives at the ten second pause just in time to hear the final ten o'clock dash. When we keep this up, we are sure to be too late sometimes. That is why QST cannot print some of the things we would like to get in. They get

there just a little bit too late. QST must positively go out on time.

Some of us wait until the twenty-fifth of the month and then ask to get an exchange advertisement or something into the issue which is already half printed. It is impossible, and some times somebody gets excited because of it. If these good souls will start a little earlier and avoid the last minute rush, there will be less burnt out fuses.

Remember, material for publication in QST must be here at Headquarters on the first day of the month preceding the date of publication. QRQ.

NATURAL WAVE LENGTHS OF ANTENNAS

Our Dear Old Friend, "The Old Man," in His Article Raises an Interesting Point Which We Should Think About.

What's the natural period of your antenna circuit? When you put your antenna up, you made up your mind you would have it good and long, did you not? You were going to get Colon loud enough to read across the room and Key West was going to beat this. And you were going to show people how loud Arlington would come in. If you lived near the sea coast, you were going to hear the ships. So you picked out the trees farthest from the house and put up the LONGEST antenna you could manage.

How does this antenna work on distant amateur stations? Most of us amateurs who are able to make a loud enough noise to be heard more than one hundred miles, get into trouble if we exceed very much the lawful wave length which is 200 meters.

Our fine LONG antenna, lead-in, and ground-lead, has a natural period of about 400 meters. Suppose we got it down to 375. How about our efficiency when we try to read a distant 200 meter signal? Of course we use a condenser in series with the ground-lead. How much does this cost in efficiency? Can we expect to hear the station with plenty of power but a long way off, sending on 200 meters? As things go, we have to depend upon forced oscillations or short subsidiary waves, subordinate to the real wave. What we should have is an antenna with a natural period of 175 meters, so that we can use a decent amount of inductance and still be down to 200 meters. Then we will hear the fellow a long distance off and it will be better all around for our relay work.

It is not as easy as it sounds to get a good efficient overhead arrangement and still have a natural period down as low as 175 meters. The lead-in must be short and the ground-lead must also be short, so that as much as possible of the limited amount of wire will be up in the air doing business. This means that a station ought to be down on the ground directly under the antenna. How many of us have given this aspect of the case serious thought? It is worth thinking about.

BOOKS ON TRANSFORMERS

We have seen the third edition of "High Pressure Transformers" by Prof. F. E. Austin. A copy of "Low Pressure Transformers" was also brought to our attention. The former should prove of great interest to all experimenters who desire to build for themselves a transformer and who at the same time wish to get acquainted with the theoretical side of transformer building. Many useful directions are given concerning the amount of iron needed per cubic inch for different frequencies, flux densities, etc. The tables contain a great deal of highly interesting data. The book is written in easily understood English and will prove very instructive to amateur wireless experimenters.

WHO'S WHO IN AMATEUR WIRELESS

We shall publish each month two pictures of amateurs who have become known by call letters. This will draw us all closer together. We are often curious as to just what the other fellow looks like, and here's our chance to see.—Editor

Jacob Weiss,

2FH

With a QRK! this life story of Mr. Weiss shook our antenna. Oh, it is a funny one. Read it and see what you think.—Editor.

I had a very good friend who owned a little cat boat about large enough to hold six or eight people comf'y. This same friend, about eight or nine years ago, invited the ladies of our home out for a sail. It was a lovely day, but while they were far off, alas, their motive power went to sleep. They were helpless. We, at home, waited patiently for the return of the prodigals, but nix return. Abt. 8:30 P. M. the hero of the occasion appeared,—that was I. I had a small motor boat and went out into the "cold dark night" on the breast of the heaving? waters, to look for them. I found them becalmed off Rye Beach, eight or ten miles from home. They were cold, hungry, and tired, but greeted me with wild

Paul T. Nesbit

6PN

Mr. Nesbit operates radio station 6PN at Acampo, California. He is nineteen years of age and has been in the amateur wireless game for the past seven years. He is a High School graduate and at the close of the season's relaying, plans to enter the University of California. At present acting as a Western Correspondent for QST. Mr. Nesbit at 6PN holds a transmitting record of 650 miles on 200 watts and on the receiving side hears KIE, NPS, NPR and NPA. A Special Amateur license is pending for this station, using wave lengths of 425 and 200 meters with a power of 1 Kw.

cheers.

Now comes the crisis of the situation. One boatman (?) said, "Jakie, you should have had a wireless ! ! ! " There! That was the thing. Wireless! How fascinating it sounded with its suggestion of mystery and distance. Well, fellow QSTISTS, I started with that carelessly spoken word and went to work. I finally made a tuner. With about twenty feet of copper wire (old electric light stuff) I erected an aerial and carried a tuner, coherer, and sounder, around with me on a board.

You may imagine the delirious delight I experienced when my sounder clicked once or twice after my wife had pressed the key down stairs. Then I carried my "Board of Receiving" to the corner, hooking onto a fire hydrant and using a telegraph pole for my aerial support. Black magic! It stilled clicked. I went two blocks away to our school; went into a small room, hung my aerial on the hatrack and hooked up to the water pipe. Still it wkd. tho feebly.

By this time, I was feeling the elation of Edison, Tesla, or Columbus. Eureka,—I had found it. I went to work again, read up a little, subscribed for Mod. Elec., & Mech., etc. (Brothers, there was no QST then) I made a so-called 6" coil. It probably only consumed 5 or 6 Kw. input (Hi). After I had burned out a ten ampere meter and punctured the insulation of the wiring of three or four perfectly innocent private houses, in our street and burned out their fixtures, I began to get wise. I had a spk. gap 1" x 1" solidly filled with blue fire; 12 wire aerial, 75 feet high and twenty 16" x 20" glass plate condenser. It was then the time of old W. A. (Pickering, I think.) on the Waldorf Astoria. You may imagine my wave length. He called me for QRM. My call was then P. N.

I was using an electrolytic detector and it was very sensitive. Every time "WA" threw his aerial switch, I could hear the static discharge from his aerial. (Will Mr. Wolfe stand for this?—Editor).

The very first sigs. I ever heard were between old D. F. (Manhattan Beach) and A. N. (Atlantic City). When I made out those sigs. I was wild with delight. Greater heights were yet to be achieved. I finally got a ½ Kw. closed core transformer which was quickly followed by a 1 Kw. A time of test QRM, etc. worked its way around.

I gradually became quite a reader and my first communication worked was with Mr. Irving Vermilya at Mt. Vernon. He made fun of my bum reading, but it was he who spurred me on to get busy and learn. After a great deal of thoughtful experimenting and burning of the "midnight" juice (when nobody would be disturbed by the flickering lights) I finally tuned up a respectable outfit. (These were called the good old days—Editor.) Soon the law was passed and I was called before the mighty ones for lack of a license. My reward was coming and I succeeded in obtaining an amateur license. You may believe I made use of my first privilege. Finally, came the greatest surprise of all; a regular 42 centimeter. I received a postal from a fellow in Cleveland, Ohio, 8FZ, asking me if I were 2FH and saying if so, he had heard my sigs. plainly. The house could not hold me. The entire neighborhood knew about it very soon. You see, Jakie and his wireless had become a by-word to the townsfolks. This bombshell was too good to hold, so I exploded it. Since that time, I have become quite a factor in the town and advance information bureau regarding press, time, and weather reports. I have always had a room full when anything is going on in the surrounding country of interest to the public and furnished the various political clubs and movie houses with the election returns as they come in.

I have now secured my second renewal of First Grade Commercial license and have the honor of being a member of the A. R. R. L. and N. A. W. A. and the I. R. E. These things may not mean much to the layman, but to you and I who have struggled and fought failure after failure at last to achieve success such as our wireless dreams never brought, it means everything. Let no amateur be discouraged. While we have QST, there is no reason for anyone to fall down. I am very proud to have it in a prominent place on my receiving table. Since those times quoted above, I have made good records communicating with such stations as 9PC, 9JB, 8NH, etc.

S. O. S.

By Robert A. Cushman, 8AEA.

JOHNSON, the second operator of the lonely Marconi station, sat wearily before his instruments. He looked at the pile of unsent messages and it seemed to grow larger and larger. It was Christmas Eve and the passengers on the ships far away on the Atlantic were sending many messages of good cheer to their loved ones at home.

No Christmas for him, he thought as he tuned to the Olympic, almost half way across. Slowly he wrote the message, sent his O. K. and sank back in the chair. Oh he was tired, so tired. Mechanically he tapped out a few of the messages before him. Even the crashing of the disc-discharger failed to arouse him from the stupor which seemed ready to overpower him at any moment. "The new man ought to come soon. I wonder if I will like him. No difference anyway, if he would only hurry up," he said sleepily.

Then he thought of poor Van Vorst, the first operator, far across the snowy waste lying in agony, perhaps, in the hospital. Well, he was having a better time than Van Vorst.

He remembered the resounding snap as the third guy wire parted. Van Vorst had climbed up the icy ladder on the tower to put another in place. The wind was blowing a deadly gale and much depended on the third guy. Van, good old man, had pulled up the heavy tackle, put the new guy wire in place, and had helped him draw it taut. The work was done and Van had started down the ladder, when the wind, in a stronger gust, caught him. His numbed hands could not withstand the blast, and with a scream for help he fell fifty feet to the ground. The deep snow had broken his fall somewhat but no snow could much deaden such an impact. Johnson ran to his assistance. Already the blood was seeping into the snow from a wound in his leg. Johnson now remembered the wound with a shudder. He had picked him up under the stress of excitement. Van was unconscious and very limp and heavy, but Johnson had bravely borne him to his bunk in the operating building. He had bandaged the leg, thanks to the first aid equipment. It was evidently a compound fracture of the right thigh. He had telephoned for an ambulance from the city, more than thirty miles distant. They had promised that the ambulance would arrive in a few hours. He had then made Van as comfortable as possible, but he was still unconscious. He had sent a message to the Marconi headquarters reporting the accident, and asking for relief. They replied that aid would be sent as soon as possible, but could not be there before Saturday noon. Then the ambulance had come and carried Van away. That seemed weeks ago, he thought as he called the Celtic to relay a message. Van went more than fifty hours ago, Thursday evening, he reflected. The clock pointed at ten thirty, Saturday, December 24. He had been almost continually on duty. Well, the relief would come soon anyway, but he was so tired.

Suddenly his deadened senses awakened. The distress signal S. O. S. was sounding from far across the deep. It was faint but clear. He read the short, frantic, position report, threw his switches, broadened his tuning and answered with all the power he could get. The great sparks danced on the disc-discharger and through the noise, the motor-generator purred contentedly. When he had finished he turned to his multiple tuner again and listened breathlessly for the reply that meant so much. A sigh of relief escaped him as the distressed ship answered. The S. S. Italia had struck a derelict in a fog. One of the world's largest ships, with a large passenger list was sinking hundreds of miles from land!

Johnson combed the ocean with his powerful spark and finally succeeded in finding a French tank ship, not more than fifty miles distant from the Italia, and several other ships somewhat farther away. The Frenchman had not heard the Italia, but was listening to a report of the same derelict that the Italia had struck, sent by a

high wave government station. He promised to try to get there in time.

Johnson's work was not done, however. He kept in touch with ships rushing to the work of rescue. Occasionally he caught reports from the Italia, detailing every stage of the disaster. Johnson was beginning to feel the strain of strenuous work but he kept on, cheering the rescuers and the Italia with reports and bits of hope. At last the Italia's high pitched wailing note was silent and a great hush fell over the stations. Finally the peculiar spark of the Frenchman broke the silence. "Loss probably small. Italia sank 12:52 a. m. Are picking up survivors rapidly." About two o'clock the next official report came. "Passenger list looked over. More than 1,800 saved. Loss will not exceed 200." A great feeling of peace overwhelmed Johnson, and he sank unconscious to the floor.

Half an hour later, three men unstrapped their snow shoes and entered the operating room. Two were expert Marconi operators and the third was a guide from the city. The storm had delayed the operators' train. When they reached the city nearest the station, they were forced to hunt for an experienced guide. Then the depth of the snow made it necessary that they make the whole distance on snow-shoes.

They lifted Johnson's limp form tenderly and placed it on his bunk. Heated stones were placed at his icy hands and feet. Then the operators went to the operating table. Much to their surprise and astonishment dozens of message blanks were found hastily scribbled over. Putting these blanks together, piece by piece, the story of the disaster was unfolded.

Sunday morning Johnson was placed on the cot next to Van Vorst in the hospital. Both were very weak but each whispered "Merry Christmas" to the other. Van Vorst's leg was beginning to heal but the effects of his operation were very apparent.

A week later, on New Year's Day, Johnson received a gold medal from the U. S. Vol. Life Saving Corps, for "distinguished service," and a chief operator's commission from the Marconi Company. Van Vorst was promoted for "valor while on duty." Two very happy men congratulated one another on the first morning of the New Year.

Arrest Radio Operator in San Antonio

Charge Amateur With "Breaking In" On Army Messages.

An amateur wireless operator, 17 years old, was arrested by federal officials, charged with interfering with the government wireless at Fort Sam Houston. The arrest was made, according to Assistant United States District Attorney Hugh R. Robertson, after the youth and his father had practically defied the federal authorities, asserting that no law prevented the use of the amateur wireless plant at any time the owner desired. The charge was made before United States Commissioner R. L. Edwards by Chief Terrell, of the secret service department, who had charge of the investigation. The complaint, drawn by Assistant District Attorney Robertson, sets out that the defendant "tampered with and interrupted telegraphic, telephonic or other system of communication used by the government." The defendant was released on $500 appearance bond.

Complaint that amateur wireless operators have been "breaking in" on the government plant has been made very frequently by General Funston. An order issued some time ago forbids such interferences, and in two instances high powered wireless amateur plants have been dismantled. Continued interruption of the government plant caused Chief Terrell of the secret service to begin an investigation which, he said, caused him to suspect the one high-powered plant yet in service. A test was made, the army post wireless sought to send messages with this plant "breaking in," with the result that the army wireless operators declared the amateur plant was the one which had been giving them trouble.

Radio Set of James H. Rau

This apparatus is located in Philadelphia. The call letters are 3AEP. Mr. Rau has worked 2RL a distance of 125 miles. During the summer he was at a camp in Island Heights, New Jersey, using call letters, 2 ARO, and succeeded in working 2RL from his home station and also from a boat. 2RL was using a one inch coil and his aerial was a 200 ft. wire supported by a kite. (That is from the boat station). His distance was about 95 miles. This makes a record for a one-inch coil, as the transmission was carried on in mid-day and in summer. The set shown in the photograph was used at the Military camp with a plain audion hook-up.

THE SENDING SET

½ Kw. Winger transformer, 14,000 sec. voltage.

8 Sections Murdock condenser, connected series parallel.

Hy-tone Rotary, having 8 stationary studs with arm revolving inside giving 1,000 sparks per second. I have been told the note is similar to a Rotary Quenched 500 cycle set.

Pan-cake type oscillation transformer.

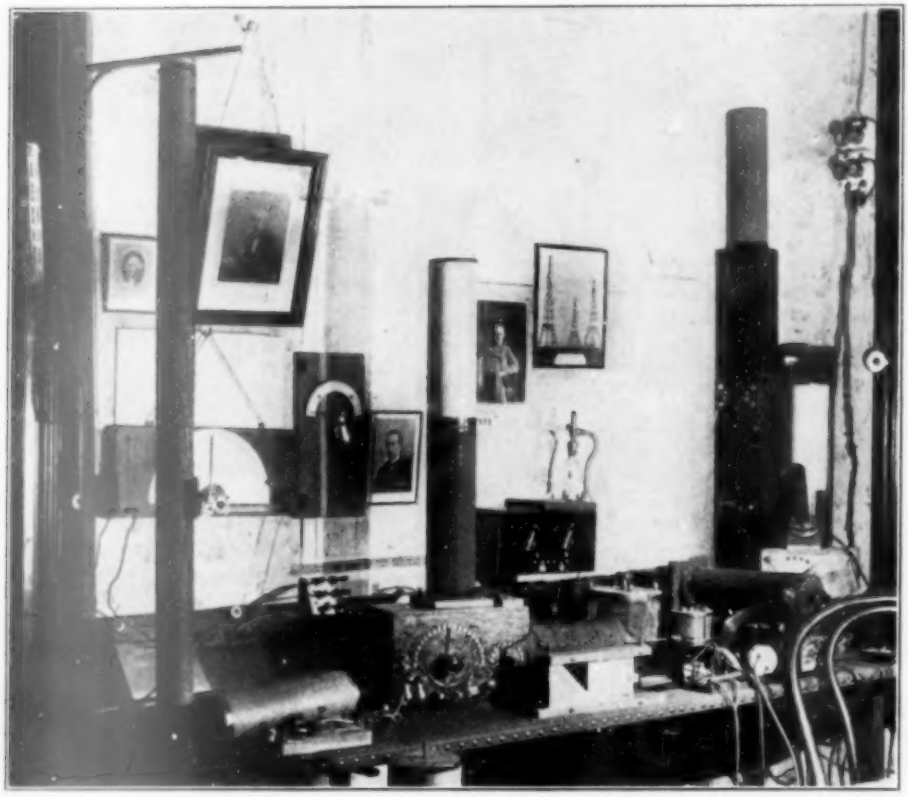
Hot-wire meter registers 4 amps. on high power.

Aerial is 70 feet at one end—45 at the other 6 wires—2 feet apart—90 feet long, inverted "L" type.

THE RECEIVING SET

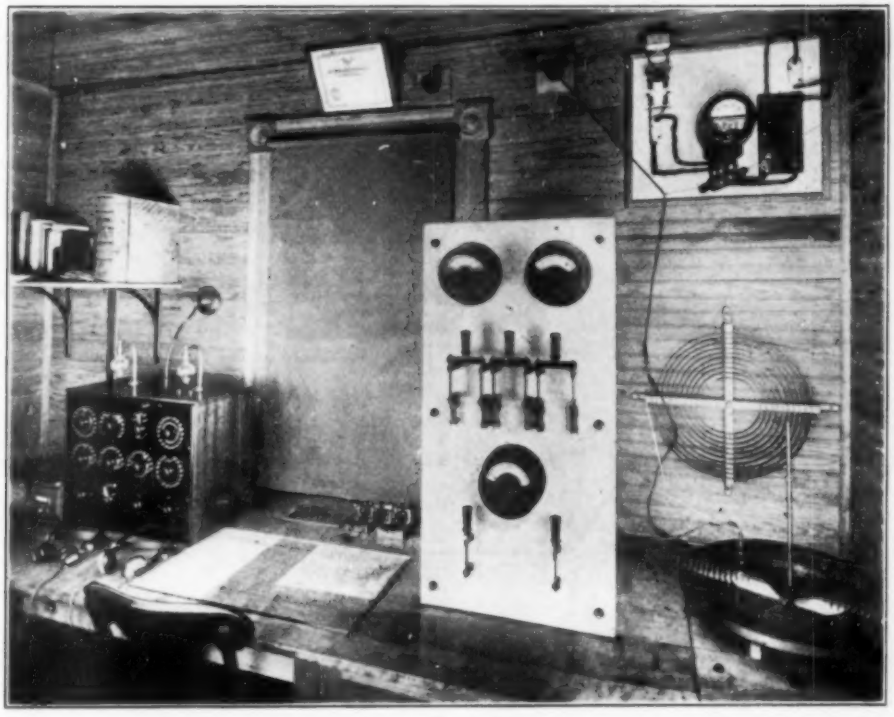
The photograph tells the story about the receiving set. In the lower right hand corner is an emergency set consisting of Crystaloi and Perikon detectors which I use mostly for local work, with the addition of Mica Diaphragm receivers, I am able to do much better work.

Westfield, N. J., Radio Station



The wireless of Charles E. Apgar is interesting from several standpoints. It was this station which did the secret service work for the United States Government during the investigation of W. S. L. During June, 1915, Mr. Apgar made phonographic records of all messages sent out from Sayville. The apparatus with which he did the work is shown in the photograph.

One of the Star Stations



The accompanying picture shows a station from which more than one of us can take a number of good ideas. This outfit is owned by Dean A. Lewis of Northampton, Mass. The call is familiar to everyone,—1ZL. The air of neatness which predominates in the picture we think has at least some effect on the actual work which has been accomplished by this station. Hundreds of relay messages go through it every week, and for long distance work, it has no equal.

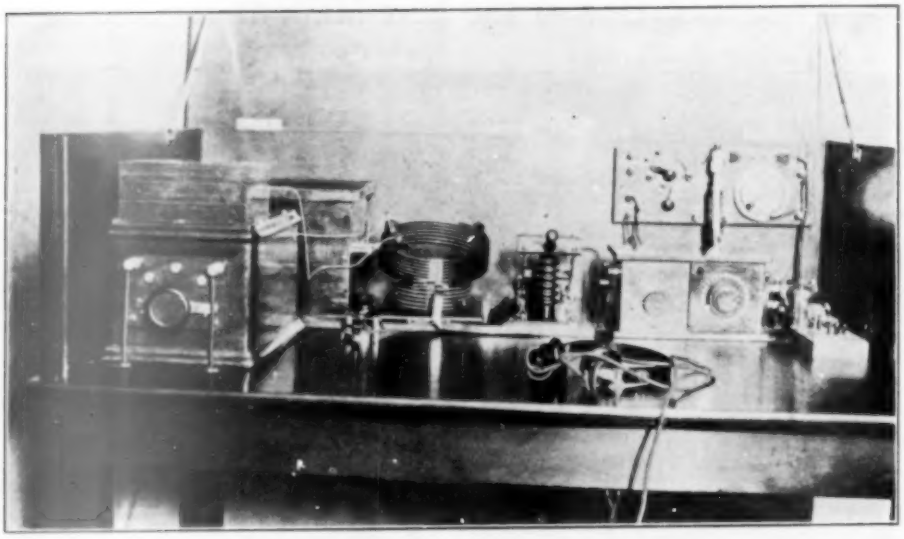
A Set Displaying Neatness and Efficiency

Mr. Lane Andonegui, Cambridge, Mass., sends us this picture of his apparatus which he thinks might assist some of our readers who might face the same problems as he did. He says:

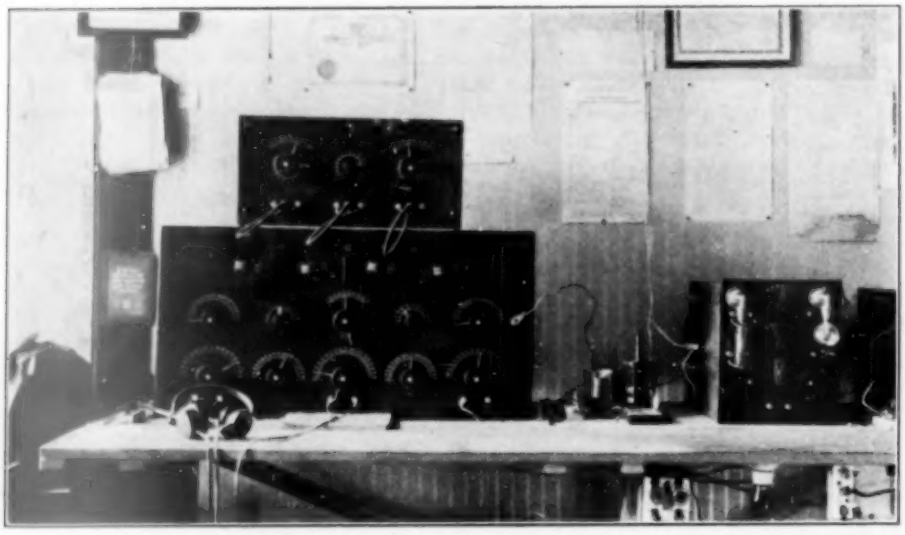
"I was forced for several reasons to install my set in the dining room of our apartment. This had to be done, however, without spoiling the appearance of the room, and for this reason I had a mahogany cabinet made which would completely hide the set when not in use, as can be seen in the picture.

There is no need to explain the apparatus, as it is all very plain in the photograph and is of well known makes. The rotary is in the box behind the transformer and is in this way made very silent."

Illustration on following page



2LK, Valley Stream, L. I.



The accompanying picture illustrates the radio station of J. O. Smith, Valley Stream, L. I. A Godley 180 to 20,000 meter wave regenerative set is used. The results are very remarkable indeed.

Radio Communications by the Amateurs

LONG DISTANCE WORK AGAIN.

To the Editors of QST:—

Just a few lines to let you know what a fine week this has been. The following is the list of call-letters of the stations which I have heard during the week of October 21-28. This with a single audion, Blitzen tuner, and Brandes 2,000 ohm phones. Isn't that fine? I have also talked with a number of the stations. 9AHK, 8AAK, 9AP, 8CO, 9RD, 8VX, 8SK, 8AOI, 8ALE, 8CS, 2DA, 9IK, 9XN, 8VP, 1EC, 2JD, 2AGJ, 5ZC, 5DU, 9ABD, 9LK, 9DK, 8JI, 9MK, 2LK, 8IF, 8AQ, 5DG, 8VX, 8ARN, 2ZP, 9NN, 1VN, 2PM, 3ZV, 9HG.

Geo. D. Bauer, Fort Wayne, Ind. 9VY.

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QRK!

Dear Editors of OUR QST:—

I have kept still about our magazine as long as I am able to. We surely have made strides in the last few months that should make all the amateurs sit up and take notice, as QST is, as one amateur recently stated to me, not full of equations which most of us do not know how to work out. It is full to the covers with the very things that we amateurs want to know. And then there is the feeling when one reads its many pages that he is one of the owners and it makes the matter doubly interesting. I have been especially interested in the various departments. "Rotten Articles" pleased me very much. The communications are great as they bring before us the luck and trouble of the other fellows. I am saying nothing that has not been said before but our book is certainly full of the best there is for the amateur as is no other book or number of books that I know of. I look for each issue as much as I would look for a letter from my best girl. I like particularly the part of our QST which shows the pictures of sets which are scattered all over the country and I have cut all these out and made a book of them which I study for good ideas and equipment.

(Sig) Don I. Shepard, St. John, Kans.

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MORE LONG DISTANCE BY OUR PRESIDENT

The following information may be of interest: On Thursday night, November 2nd, I heard at my station in Hartford, the following:—

9VY Fort Wayne, Ind. Loud and Clear.
8AEZ Lima, Ohio. Extra loud and clear. Read thru QRM.
8CO Grove City, Pa. Loud and easy to read.
8VX Buffalo, N. Y. Loud but fluttering, He was working 8AEZ.
8AQ Pittsburgh, Pa. Fairly loud.
2JU Woodhaven, N. Y. Fair.
2ZV Jamaica, N. Y. Fairly loud.
8QK Elyria, N. Y. Quite loud.

Hiram Percy Maxim, 1ZM.

oo

ANOTHER HARTFORD STATION HEARS LONG DISTANCE.

Mr. Southworth, 1VN of Hartford, Connecticut informs us that he heard the following stations during three nights this fall. 1CM, 1LE, 2AGJ, 2DA, 2LK, 2ZV, 2FS, 2ABG, 2PH, 2PM, 3TQ, 3SZ, 3IM, 3WW, 8JX, 8AEZ, 8OH, 8NQ, 8NB, 8AOF, 8BE, 8NH, 8CS, 8NF, 8JZ, 8LE, 8IQ, 8QK, 8AIM, 8AOM, 8JY, 8YO, 8ZY, 8SK, 8AOI, 9AEG, 9ACM, 9JI, 9VY, 9WG, 9DB, 9EG, 9WG.

A RECORD DISTANCE

Dear Sir:—

Speaking of long distance work on the part of others, I wish to state that I copied 6HS (1,740 miles from here) and also 1ATY (1,080 miles) very clearly in fact they came in as loud as any station outside the State. On the same night I copied the following outside of the state,—8NF, 8NH, 8AEZ, 8YI, 9ZF, 9IK, 9ADT, 9ZS, VJ, KIX.

I use no amplifier of any kind, an Audiotron bulb, Navy tuner, one variable, Brandes phones. My aerial is 60 feet high, 90 feet long and of the "T" type.

Wishing QST much good luck, I beg to remain,

Very truly yours,

(Sig) Peter A. Stover, Marengo, Ia. 9LP.

OO

LONG DISTANCE FROM ARKANSAS.

Gentlemen:—

Will you kindly publish this list of stations copies at my station between October 1st and October 28th, as I can't write to all of the fellows I hear and maybe some of them are far off and on low power. Also say that I will be pleased to drop a card to any of them telling them how they came in if they will notify me.

9RD, 9NU, 9ABD, 9HQ, 9AAR, 9AWS, 9RJ, 9GJ, 9NN, 9TA, HB, 9EG, 9EM, 8OH, 8CS, 9FR, 9ME, 9NE, 9QL, WS, 9WG, 9ACM, 8AEZ, 9IK, 9AKL, 9VH, 9ZL, 9ON, 9JI, 8XA, 8CL, 9NW, 8AOF, 5BB, 9ADW, 9WF, 9DG, 9WI, 9AGH, 9WU, 9JS, 8NH, 8YO, 8NF, 9PC, 9HX, 5AA, 9LR, 9AIK, 5DU, 9MR, 9PO, 9MK, 9HU, 9QM, 9GY, 5ZC, 9AJ, 9VG, 9YO, 9DV, 9AAB, 9VP, 9ABM, 9DH, 9SI, GP, 9GE, 9IO, 9DB, 9BD, 9NU, 5YG, 9FW, 5AX, 5BB, 9AEV, 5AM, 5ED, 9EP, 9HS, 4CL, 4DG, 9VY, 9AW, 8LJ, 9GR, 9NN, 9IC, 9ON, 9DK, 9BJ, 5EF, 8JG, 8JZ, 8JY.

(Sig.) J. M. Clayton, Little Rock, Ark.

IS YOUR CALL HERE?

Editor QST:—

The following stations have been heard at 2CE between October 24th and November 4th. I am sure that there are many who will be glad to see their call here. 1QX, 1LE, 1ZD, 1IZ, 1CM, 3WN, 3SZ, 3VH, 3AMP, 4DI, (I wish that 4DI would drop me a card), 8HQ, 8AEZ, 8ADB, 8AKK, 8OH, 8VX, 8ADE, 8NH, 8WO, 8FR, 8AKP, 8ETM, 8AAR, 8AEH, 8CO, 8QK, 8AOF, 8IK, 8CL, 8ALE, 8MF, 8AHN, 8VW, 8JX, 8NF, 8HB, 8JG, 8VC, 8ACK, 8LE, 8JA, 8ACI, 9PC, 9WF, 9WG, 8VY, 9ACM, 9SX, 2BE, 2AME, 2NN, 2RA, 2AZ, 2BG, 2NP, 3KS, 2AEB, 2MY, 2AGJ, 2DA, 2AUG, 2ZH, 2BW, 2IK, 2ALS, 2RS, 2LC, 2AIO. I have heard many of these as early as 4 p. m.

John W. Dain, Peekskill, N. Y.

OO

OCTOBER 27TH RELAY

Dear Sirs:—

I wish to give the following report on the relay message of Friday night October 27th. On account of a lot of inductive QRM, fading signals and some Pittsburgh "Hams" who seemed to think nothing of the importance of the message, I was only able to get a complete copy from 8AEZ, QST de 8AEZ. Msg "President Wilson says "I neither seek the favor nor fear the displeasure of that small alienment amongst us which puts (misspelled word) loyalty to a foreign power before loyalty to the United States.

The next most complete message was received from 8SK but did not get the misspelled word on account of swing. Also heard nearly complete from 8CO but had QRM by WHB at this time. Heard bits of the message from following stations,—8JZ, 9BD, 9IC, and 2ZB. Later on heard CQ de 1IZ and called him. Could not work on account of QRM and swinging signals. Monday night heard and copied 1VY the signals being very strong and uniform.

(Sig.) Frank G. Beck, 8KF.

OO

THE RELAY MESSAGE AGAIN.

Gentlemen:—

I received the Amateur Relay message on October 27th at 8:40 p. m. Pacific Coast Time. If this message was sent at 10:00 p. m. Central Time from Davenport, Iowa, it took me just 40 minutes to get the news.

My station is the farthest west in the United States, as I am located directly on the shore of the Pacific Ocean. The message was received first by me from 7ZH (Heacock at La Grande, Ore.) a distance of about 600 miles. Later I got it from 7YS (Ruth at Lacy, Wash.) a distance of about 50 miles. I in turn sent it out broadcast and my message was picked up by the steamer WAY bound from Seattle to San Francisco.

(Sig.) Henry W. Blagen, 7DJ.

A NEW "TWO" STATION

Editor QST:—

We have noticed in your last issue several communications from amateurs giving a list of stations heard by them. Our station has been in operation but ten days under our present call, however we heard shortly after sundown here the signals from 9IC, 9IK, 9GJ, 9DC, 9ON, which came in remarkably strong every night considering their distance from New York.

Our call is 2PM and we would appreciate a card from those stations which may at any time hear our signals.

Very truly yours,

A. J. Faraon and J. F. Grinan,

808 West End Ave., New York, N. Y.

LIGHTNING

I would like to make a suggestion for the writing of an article for QST which I think would be of interest to the amateurs. It is lightning which is a subject about which all radio fans have a general idea and very few have any real notion of the scientific principles and phenomena involved. A few articles dealing with lightning have been presented to the amateur in various technical magazines but they have been on a single phase of lightning, no comprehensive article as yet appearing to my knowledge which covers it in a concise way which is possible. How many of us know what causes a thunder storm; whether the clouds are charged positive or negative; how the charge gets there; how it accumulates; why it hits a certain place; what is the voltage of the discharge; what is the distance it jumps, the action of lightning when it hits metal conductors; different kinds of lightning; how measured, protection of RADIO STATION and a host of other questions which one may easily think of. (We think that Mr. Service has already delved into the whole personal history of the poor lightning and exposed to every unfeeling gaze its innermost secrets. Ed.) We all know the answer to some of them but there are mighty few who could give a clear correct explanation. If some of your technical staff could write a complete article covering this I'm sure that it would be appreciated by all of us fellows. In closing, let me say that I sincerely wish that I could tell you how much we amateurs in Philadelphia look forward to QST and what a help it is. The articles by Mr. Godley were especially worthy of mention.

Yours very truly,

Charles Service, Bala, Pa.

Mr. Service's article suggestion will undoubtedly come to our minds again next summer when old Jupe Pluvius and his contemporaries get back from their vacation. Ed.

YOUNG WIRELESS OPERATOR AT W. C. C.

By Irving Vermilya

I consider your magazine, QST, an excellent one and just the thing for the amateur. Enclosed you will find a picture of

my son, William Irving Vermilya who, I think, is quite the youngest operator in

America. This picture was taken when he was but fifteen months of age. You have my permission to use it if you wish. I have given it the title "William Irving Vermilya Receives Cape Cod without Aerial or Ground at the Age of Fifteen Months." Best wishes to you all.—Irving Vermilya, Manager, W. C. C.

oo

NOTICE

John M. Clayton, 5BV, informs us that his station has only been equipped for out of town transmitting since October 1, 1916. All stations who have heard the call 5BV prior to this time heard 5XO who was using 5BV temporarily. Anyone who has heard 5BV after October 1st, and who is more than 400 miles distant will confer a great favor upon me by advising.

Considerable confusion has been caused by the fact that before 5XO obtained a license he used my call and hence I am unable to know just how far my sigs are carrying.

(Sgd) JOHN M. CLAYTON, 5BV,
1301 Welch St.,
Little Rock, Ark.

Efficient Short Wave Transmitting.

Continued from page 9

pitch or tone. It might be of assistance to have figures on this point also. Tests at Brant Rock on audibility were conducted with various spark frequencies. A telephone receiver was used which could be energized at various spark frequencies. It was found that .00062 volts was necessary at 60 cycle frequency to produce audibility. When the frequency was raised to 900 per second, only .0000006 volts were necessary to produce audibility. From this it is plain that it requires roughly 1000 times more voltage at 60 cycle frequency than it does at 900 frequency. This would seem to dispose of the matter of pitch or tone. The amateur will reach farther if he has a high spark frequency, and therefore a high tone.

In concluding this general survey of transmitting efficiency, a word should be said on the subject of actual decrement values. We all know the law says our wave shall not dampen quicker than two-tenths. But the law also says we may send out SOS calls more quickly damped. The SOS call should carry the greatest possible distance, and the reason it does is because, it is almost an impulse, rather than a series of waves, if it is damped to the limit. The actual number of waves which occur before the amplitude has fallen to one-tenth of the maximum amplitude for different decrements, has been determined. The figures are given in the table herewith:—

Decrement	No. of waves.
.2	12.5
.1	24
.08	30
.06	39
.04	58
.03	78
.02	116

If the damping is so quick that a wave train becomes a series of waveless pulses, there is of course no such thing as tuning, and the signal is heard broadly. On the other hand if the damping is not quick and the radiating antenna persists in its oscillations, then their is a sustained train of waves and tuning becomes necessary.

The amateur is probably destined to be very numerous and interference will become more and more troublesome. Long distance transmission then will depend for its success much upon sharp tuning. Decrement is therefore an important element in actual operating efficiency, and a station owner should study to so reduce his inductance as to give him well sustained oscillations in his antenna. One of the small wave meters using the flash light bulb can be used after a little practice to get a rough idea as to persistency of oscillation. On a well proportioned antenna circuit, the lamp will hold its brilliancy a perceptible time after opening the circuit.

Among the Radio Clubs

SAN JOAQUIN VALLEY RADIO ASSOCIATION

This association was formed during the winter of 1915 by the followers of amateur wireless in and around Stockton, Calif. As summer came on it was decided to adjourn until Sept. 1st of this year, when an enthusiastic meeting was held and Club activities resumed with fresh spirit. The Association, though still small, is very much alive and several unique features are to be noted. Among these is a complete elementary course in the principles of electricity as applied to wireless, for the younger members. Another thing, which, while perhaps not unique, is in accordance with the latest practice of the large Clubs, is the maintainance of a Radio Inspector, whose business it is to keep the members stations tuned to maximum efficiency and in compliance with the law. Officers at present are: President, H. C. Macquairie; Vice, Geo. Williams, Sec. Treas., John Jackson.

SAN FRANCISCO'S RADIO CLUB MAKES GREAT PROGRESS

The San Francisco Radio Club, one of the most popular Radio organizations of the Pacific Coast, has made such rapid progress during the last two months that it became necessary to occupy a larger and modern club room. An Assistant Secretary-Treasurer, Mr. E. W. Radford, was elected to relieve Secretary Treasurer H. R. Lee of part of his work.

The new club room is located on the north-east corner of Frederick and Belvedere streets, easily reached by several street car lines and situated in the typical residence district of the city. Main offices of the club will soon be established in a prominent office building in the business section of the city, a radio station and laboratory are to be installed in the new club room in due course of time. In order to advertise the club on a large scale throughout California, the Year Book of the San Francisco Radio Club was resorted to; this book containing twenty pages of interesting reading matter. It also contains a list of members, their addresses, notes on lectures, meetings, etc. Within the course of three weeks sixteen new members were admitted to the organization, the membership now standing at 46.

The book will be sent free to any address in the United States upon receipt of a two cent stamp to lighten the burdensome mailing charges. Amateur and commercial radio operators in the Bay Cities will soon be called upon to join the club, this point has been overlooked for some time due to the small size of the former club room. Member W. M. Griffith has been assigned to the steamer "Providencia" as radio operator by the Haller Cunningham electric Co. Mr. L. O. Fassett has accepted a position with the Federal Tel. Co. on the Str. "Yale". Mr. H. R. Spraddo of the National Wireless Telephone Co., has been admitted to the club as a member, Mr. F. L. Busch operator at the U. S. Army station at Fort Winfield Scott has been made a member.

The tuning of amateur stations to comply with the government regulations has started, amateur interference in this city is steadily declining due to the information obtained through members at the club.

Mr. C. M. Heaney and Mr. H. Malarin, newly elected Examining Officers, will conduct the club examination for full grade membership, the examination taking place during the first week of October.

Desired information will gladly be furnished to any prospective members who reside in San Francisco or the Bay cities. All correspondence should be addressed to the Sec'y. Treas. Mr. H. R. Lee, 1580 Grove St.

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INSTITUTE OF RADIO ENGINEERS

A regular meeting of The Institute of Radio Engineers was held Wednesday evening, October 4th, in The Engineering Society's Building, New York. Mr. Edwin H. Armstrong presented a paper on "The Heterodyne Theory" of Amplification and Its Relation to the Oscillating Audion." The paper was an extension of the valuable work contributed by Mr. Armstrong in 1915. The data is of a highly interesting character.

oo

RADIO AMATEURS OF JERSEY CITY ORGANIZE A CLUB

The Hudson City Radio Association held its first meeting at the home of Frank V. Bremer. The officers elected are as follows: President, Max Khilline, Vice President, Joseph Grece, Treasurer, Max Schwartz, Secretary, Frank V. Bremer, Assistant Secretary, Clarence Maves. The object of the organization is to establish a relay chain among the amateurs of Hudson County and to promote friendship among the experimenters. All amateurs are invited to join. Address the Secretary at 3613 Boulevard, Jersey City, N. J.

oo

BINGHAMTON PROGRESSIVE RADIO ASSOCIATION

The Binghamton Progressive Radio Association held its first meeting of the 1916 and 1917 season in their club which is located at the corner of Glenwood and Main Streets. The club house consists of a one-story building which was bought and erected by the club members one year ago. The meeting was opened by the President who gave a short talk on the work of the past year. This talk was followed by another from the new President on the coming year. The discussion arose as to the purchase of a new set. It was decided to install both damped and undamped wave sets. The club will be glad to make a test with any amateur. You can reach us by calling 8WO or 8WW or 8ALO. Within a month or so the club will be using its own call.

oo

ATLANTA RADIO CLUB

The Atlanta Radio Club recently elected the following officers: R. A. DeVore, President, F. F. Merriam, Vice-President, M. A. Herzog, Secretary, S. Hall, Official Operator, B. Flowers, Radio Inspector. The members are active in relay work and offer their co-operation to the League in every possible way. We are working to unite the Georgia amateurs and to perfect the relay route running through the State.

The constitution, by-laws and rules of the Atlanta Radio Club are very interesting and might be useful to other clubs if their Secretary would secure a copy. Among are rules are found valuable data for radio operating. The rules are of such general nature that we take pleasure in printing them for the use of other local organizations. If these rules are followed, much local QRM will undoubtedly be done away with. The Editor advises all local clubs to look over the rules and bring the question up at the next club meeting of adopting them.

Atlanta Radio Club Operating Rules

1. Calling—The call shall comprise the signal —.—.—, the call letters of the station called transmitted three times; the word "From," followed by the call letters of the sending station, transmitted two times, following with the letter "K," (—.—) once only.

2. Answering—The called station shall answer by making the signal —.—.—, fol-

lowed by the call letters of the transmitting station three times, then the word "From" and its own call letters two times, then the signal "K", (—.—) once only.

3. **Reception of Calls** — If the station called does not answer within two minutes, the calling station shall repeat call as prescribed in Paragraph 1; then if station does not answer the calling station shall wait for a period of fifteen minutes before repeating call.

4. **Limitation of Conversations**—Stations holding conversations shall be limited to a period of fifteen minutes; at the expiration of said time the station talking shall give the signal ...—.— three times. Then after a period of three minutes if no other station wishes to talk, conversation may be resumed.

5. **Priority of N. A. A.**—All stations shall cease sending at 10 minutes before 9:00 p. m., and not resume until 5 minutes after 9:00 p. m., local time.

6. **Priority of Official Messages**—All stations shall cease sending at 8:00 p. m. each Thursday for the reception of Q. S. T. from Official Operator, and remain silent until completion of Official Business. All stations shall cease sending upon receipt of Q. S. T. from Official Operator, and remain silent until completion of Official Business, which shall be indicated by Official Operator's call and signal.

7. **Use of Abbreviations**—All stations shall make use of standard abbreviations whenever possible.

8. **Priority in Calling**—When two or more stations call at the same time shall be determined by priority number.

9. **Priority Number**—Shall be given in accordance with percentage obtained in class examinations.

10.—**Practice**—No person shall at any time practice with his transmitter connected to his aerial.

11. **Tuning or Adjusting Spark Gap**—Must be done at times when it is not likely to cause interference with other stations.

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UNITED STATES GOVERNMENT RADIO INSPECTOR ADDRESSES RADIO CLUB

At the regular business meeting of the San Francisco Radio Club, held at their new club room, 350 Frederick Street, Friday evening, October 13th, United States Government Radio Inspector, E. W. Stone, of the local Custom House, addressed the membership, giving a complete discussion on the subject "Decrement." Forty-six members were present, the speaker remarking that the San Francisco Radio Club was the largest radio organization that he has ever addressed and expressed his appreciation to the officers of the Club regarding the excellent work that the club has performed.

He stated that the organization was of much assistance to the local radio office and also stated that San Francisco has the only radio club that has undertaken the task of publishing a "Year Book" with the exception of the Institute of Radio Engineers.

Mr. Stone explained the tuning of sets to resonance to comply with the radio law, stating many facts that held the members present spell bound. He concluded by stating that the only type of sending aerial to be used by amateurs on 200 meter work was a short aerial without the use of a series condenser.

Three business meetings are held monthly and a very interesting program of lectures has been arranged by the President of the Club, Mr. H. W. Dickow.

The next issue of the Club Proceedings will be ready for distribution at the termination of the year and a fifty-page magazine sized publication will be issued quarterly similar to that employed by the Institute of Radio Engineers and will contain some very interesting facts of the accomplishments of both amateur and commercial members of the Club. The membership directory now contains the names of fifty-six radio operators of San Francisco, twenty new members being admitted to the Club in the past month.

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DEMONSTRATION IN FRESNO, CALIF.

At the Radio Club demonstration at the Fresno Fair the Navy Department assigned three fifteen minutes periods each day when Mr. Denny, operator in charge, was allowed to use a wave length of 1,000 meters, and a message was sent by the President of the Fair to the Mayor of San Francisco and

the Governor, inviting them to attend the Fair and act as judges in the auto races, etc. Our club is prospering very well and has about 25 members now, half of whom are men; three or four are operators.

The Government officials are doing all they consistently can to encourage this sort of thing.

QST is read by almost every member of the club and many who are not members. Stay with it, you are making a grand success of QST and in a year or two it will be far ahead of anything else published in the interest of amateur radio telegraphy.

Yours very truly,

(Sig.) O. M. Howard.

OO

WIRELESS AMATEURS OF HUDSON COUNTY HAVE OPENED NEW CLUB ROOMS

The Hudson City Radio Association has secured rooms at 541 Central Avenue, Jersey City, where they have erected a large aerial and a sensitive receiving outfit. Code practice is given every night to those who desire it. Lectures on how to secure an operator's license and use and operation of the audion will be given shortly.

Election of permanent officers was held last week, with the following officers elected: President, Joseph F. Grece; Vice-President, William Biedenkapp; Financial Secretary, Frank V. Bremer; Recording Secretary, Clarence Maves; Treasurer, William S. Davidson.

All amateurs in Hudson County are invited to join the association. Address Clarence Maves, Secretary, 90 Ferry St., Jersey City, for an application blank.

OO

WIRELESS ASSOCIATION OF ATLANTIC CITY

The Wireless Association of Atlantic City is enjoying the fifth winter session of its organization. The present officers are, Charles Seymour, President; Clarence Cramer, Secretary; Captain N. J. Jeffries, Treasurer; and Earle Godfrey, Business Manager. Business meetings are held the first Wednesday of each month at the Association Headquarters, No. 314 Guarantee Trust Building, while on the remaining Wednesdays of each month, general meetings are held at the club station "3IF," St. Charles Place. Here the theoretical and practical branches of radio are taken up.

The Association was organized in the Fall of 1911, upon the suggestion of J. Parker Hipple and called together by Earle Godfrey, "3IF" at his station. Since that time, the Club has seen many new members and said "Good-bye" to many more who have taken up their occupations elsewhere. Our President was at one time an operator on the Great Lakes when wireless was considered a joke. Rohland Doughty, "3SQ" recently joined the Marconi ranks, while others have entered law, electrical engineering, business and trades of all kinds, but still united by a common bond, "wireless," the password to friendship in every city of our land. The Association is always glad to welcome strangers at its meetings and to exchange ideas and experiences. Best regards for success to QST and "73's" to the radio world.

Trunk Line Reports. Cont. from page 20

Test messages will be sent as usual until further notice.

Respectfully,

R. H. G. Mathews, "9IK."
Dist. Mgr., 1316 Carmen Ave.,
Chicago, Ill.

As a further correction to my report in the October QST I will add that the new route thru Iowa will be called Route G, and not Route F.

Juice. Continued from page 15

too thirsty for juice may knock out the Light Company, who sometimes refuse to supply and this leaves all the amateurs stranded. The thoughtless actions of one may bring trouble and complaints to the unoffending members of a wireless community. Isn't that so, Mr. Editor?

This new department has been opened up for the benefit of the readers of "QST", Letters should be addressed, "QST", care of The American Radio Relay League. The Queries Department, Hartford, Conn. The questions will be answered free of charge and as promptly as possible. The answers will in each case, appear in "QST", provided however, they are of interest to the average reader. We are not in a position to answer questions requiring a long, mathematical solution.

The Editor hopes to receive a large number of interesting questions for the next issue. He trusts that you will make your questions of general interest and will refrain from asking questions which you can answer by consulting the Radio Laws and the Call Letter Books. "QST" does not wish to pad this department out with a series of uninteresting, foolish, questions.

Charles Huntington, Mass.

It is impossible for us to tell you why you cannot get amateur stations of 1 and of ½ Kw. 30 and 40 miles away. You seem to have sufficient apparatus and of the right kind. Your inability to receive these stations may be due as much to the transmitting station as to the receiving. Concentrate and try again.

C. H. Gustafson, Ills.

1—The induction from lights which you experience cannot be avoided as long as it exists. It is due to an imperfect commutator on the supply generator or to imperfect insulation of the supply lines. It may be that you can prevail upon the electric light company to look into the matter.

2—For regenerative audion hook-ups see "Applications of the Audion" by Paul F. Godley in August and September issues of "QST."

G. E. Wilcox, Ills.

1—The wave length of the antenna in your diagram is slightly in excess of 200 meters, but otherwise is O.K. for transmitting. To comply with the law, it will be necessary for you to use an oscillation transformer, the number of turns in use on primary and secondary depending respectively on the natural wave-length of your antenna and the amount of capacity used in your closed circuit. May we suggest that there are several good text books on wireless telegraphy which would be of material aid to you in solving your difficulties, notably Lieut. S. S. Robison's Manual of Wireless (Radio) Telegraphy for the Use of Naval Electricians which may be obtained from the Government Printing Office, Washington, D. C., and Alfred P. Morgan's, "Wireless Telegraph Construction for Amateurs," to be had of the Adams Morgan Company, Upper Montclair, N. J.

N. Sylvester, N. Y.

For wave-length of your antenna see answer to W. J. King, October issue "QST." You may approximate the fundamental wave-length of your antenna by multiplying the total length of your antenna from the apparatus to the end of the wire in meters by 4.7. The presence of conducting bodies or dielectric bodies in proximity to the antenna may materially effect its natural wave-length.

Jack Simons, N. Y.

1—Give dimensions of condenser to be used across the vibrator of a 1" spark coil, the condenser to be rolled up.

Cut 7 sheets of parafine paper 30" long by 4⅜" wide. Also cut 6 sheets of tinfoil 30" long and 4" wide.

2—Will a 6 v. 15 a. h. storage battery be suitable for a 1" coil? Yes.

W. M. Sorgeus, N. Y.

1—Would it be practicable to use an electrolytic rectifier to obtain direct current from the alternating current house supply for audion uses?

No, CONTINUOUS current only is suitable for use with the audion. This can be had only by the use of primary or secondary batteries, inasmuch as a rectified alternating current or the current from a D. C. generator is a pulsating current, and consequently would of necessity produce objectionable noises in the receivers.

2—Please explain the construction of loud speaking apparatus for receiving wireless signals without receivers on the head.

You may avail yourself of such an arrangement by connecting mechanically the diaphragm of your receiver to the diaphragm of a telephone transmitter. In series with the transmitter is placed one to three cells of battery and a 75 ohm telephone receiver. The instruments advertised for the purpose you mention operate on this principal.

Walter Lacock, Pa.

1—What phenomena causes the increase of signals when I touch the rheostat on Audion RJ-4, and likewise when I touch one slide of the secondary of loose coupler? Signals cut out when I touch both at the same time.

This effect is without doubt due to the fact that your secondary circuit is not properly tuned. The connection of your body to the secondary circuit increases the period of that circuit, and may at the same time tend to increase the effective coupling between the secondary and the primary. Are you using a variable condenser in shunt to secondary for tuning the closed circuit?

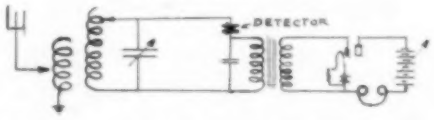
Burr Stalnaker, W. Va.

1—On a core 2" square, 3 lbs. of No. 32 enamelled magnet wire should be sufficient for a ½ Kw. wireless transformer, where layer construction is used.

R. W. Cushman, Vt.

1—Is it possible to use an audion as an amplifier for a crystaloi detector? If so give a good hook-up.

Hook-up herewith



2—Referring to Fig. 16, Page 199 August "QST" should the coils P and S be in the form of a loose-coupler? Why is P so much smaller than S?

Yes. It makes no difference whether P is smaller or larger in diameter than S as far as results obtained are concerned if that is what you mean. The electrical constants of P are smaller because it is assumed that a fair sized antenna is to be used with P. In case an extremely small antenna is used, it may become necessary to increase the electrical constants of P by increasing the number of turns.

H. R. Butt, Va.

1—Do you consider the circuit shown on page 200 Fig. 17 the most sensitive for amateur reception?

They are the best of which we know.

2—Please give dimensions for the different coils to be used up to about 250 meters. The wave-lengths of the aerial is about 160 meters.

Primary and secondary may be identical as to number of turns. The secondary may slide within the primary. The ball of your variometer may be 4" in diameter and the field pieces of the variometer to match. Wind with No. 18 D. C. C. C.

3—Could this circuit be used for 600 meters if put on an aerial having a fundamental of 475 meters?

Yes. On either aerial.

4—The "L" type antenna is better in your

Continued on page 46

Prizes Awarded

November 18th, 10:00 P. M.

A banner day indeed—with blood red letters, white subscription blanks and blue money orders flying, not to mention yellow telegrams, and it is with a sigh of relief that we note that tomorrow is Sunday as we turn to read our war correspondent's version of the Contest. Here it is—"It was a great battle and everyone is victorious. The subscription army has been mobilizing for the last two months and is closing in on all sides. Then even as David and Goliath went forth, Mr. Charles A. Service of Bala, Pennsylvania and Mr. Joseph Morgan of Germantown, Pennsylvania came forward as the champions of two cities. Although this battle did not have the disastrous results of the first mentioned one, the conflict was so severe that the other contestants paled into insignificance for the time being. Mr. Service started with 28 subscriptions and along came Mr. Morgan with 20. This worried Service so he sent in 16 more. Morgan retaliated with 22. Service landed 12 fast ones but Morgan capped it with 16. This made Service wild so he scraped up 10 more, but Morgan came back with 18 and almost put Service out for the count. The last dispatch on the 18th brought 2 more from Morgan as a factor of safety but a telegram at 9:58 reported Service 12 more. Then the order was given to cease firing. The battle closed with no advantage on either side, both having 78 prisoners or 936 credits. There were many other hot scrimmages, lots of fast work and narrow escapes. Here's the way it finished:

	Credits	Prizes
Joseph Morgan, Jr., Germantown, Pa.	936	DeForest Audion RJ8
Charles A. Service, Bala, Pa.	936	DeForest Audion RJ8
G. L. Hartman, Wauwatosa, Wis.	481	Brandes 3200 Ohm Phones
P. H. Betts, Montclair, N. J.	288	DeForest Audion RJ9
Hodge Alexander, Grove City, Pa.	270	Rotary Quenched Gap
C. R. Pardridge, Saginaw, Mich.	268	Brandes 2800 Ohm Phones
A. O. Parmalee, Reading, Mass.	266	DeForest Type "T" Audion Bulb
Ralph Batcher, Ames, Iowa	240	"
Carl Linxweiler, Dayton, Ohio	222	"
H. R. Hick, Rocky Hill, Conn.	192	"
Charles Shanks, Maplewood, Mo.	164	"
Oscar Hanger, Haledon, N. J.	144	"
F. F. Humphreys, New York, N. Y.	144	"
R. N. Kingsbury, Ravenna, Ohio	120	"
W. O. Watkins, Birmingham, Ala.	120	"
E. C. Wiendieck, Merrick, N. Y.	120	"
Warren J. Mayer, Elizabeth, N. J.	99	Brandes 2000 Ohm Phones
Billy Fresh, New York, N. Y.	97	Brandes 2000 Ohm Phones
R. W. Pratt, Portland, Me.	84	Brandes 2000 Ohm Phones
P. J. McGee, Mattoon, Ill.	82	Crystaloi Detector
G. F. Tompkins, Hasbrouck Hgts, N. J.	72	Crystaloi Detector

Although we had not agreed to, we are giving each one of the first two QST Helpers a first prize for they have really worked hard. At first we had a little doubt as to whose name to place first but finally left it to the alphabet as in the other cases of ties. We want to thank all of those who entered the Contest for their generous support. It means something more to us than just subscriptions or prizes. Many of them were handed in with scarcely a thought for the prizes but just to help out our good old QST, and that was reward in itself. To those who didn't win prizes and those who didn't try we would suggest that they pitch in early with lots of ginger into our next Contest.

FOR SALE & EXCHANGE

FOR SALE OR EXCHANGE—One 2" coil, $4.00; 4,000 meter loose coupler, $4.00; Helix type oscillation transformer, $1.00; also have ½ Kw. transformer coil, $6.00; 600 meter coupler, $3.00. Will trade for pancake oscillation transformer. C. W. Gilfillan, 603 West 8th St., Austin, Tex.

FOR SALE OR EXCHANGE—Complete ½ Kw. installation, comprising the following: ½ Kw. Winger transformer, plate glass condenser, oscillation transformer, rotary gap with rheostat, all mounted in oak cabinet; receiving set includes Navy type tuner, two variables, fixed condenser, galena detector, all mounted in oak cabinet. Brandes 2,000 ohm phones, aerial switch and key. Everything is in perfect condition. Photo on request. Will sell for $30.00 or will exchange for wireless goods. What have you? Darrell Minkler, 9 Mistletoe St., Medford, Ore.

TO EXCHANGE OR SELL—A Multi-Speed shutter (4x5 or 5x7 lense) speeds one second to 1/2,000 of a second. Hardly used and cost $25.00; full instructions. Wanted Murdock .001 and .0005 variable condensers, Multi-Audi-Fone hot wire ammeter, 110 v. inductive motor, etc. Make offer. J. H. Ferris, 19 Howard St., Detroit, Mich.

FOR SALE—One sliding plate variable condenser mfd. by Electro Insp. Co., $2.00; one double throw double pole antenna switch, 50c.; one telephone transmitter for wireless telephone experiments, 75c.; one cut-out with two ten amp. fuses, 50c.; Will trade all except condenser for a 20 ohm telegraph sounder and key. J. Richard Todd, Louisville, Ill.

FOR SALE—New DeForest RJ8 audion, with bulb in perfect condition for $20.00. L. M. Hulse, 9 James St., Middletown, N. Y.

HALF KW HYTONE SET FOR SALE—Motor and gap just overhauled by makers and whole set absolutely guaranteed first-class electrical and mechanical condition. Price, $50.00. F. O. B. destination, east of Mississippi. J. O. Smith, 47 Catherine St., Valley Stream, L. I., N. Y.

FOR SALE—One twelve-inch Meyrowitz spark coil in oak case. One large three section electrolytic interrupter. Listed at $160. and $75 respectively. For schools, experimental purposes, etc. Good condition. No good offer refused. All answered. Mr. Colin Simkin, 44 High St., Hartford, Conn.

FOR SALE—Am compelled to sell 8TY receiving set with a range of Athens, Greece and a ½ Kw. transmitter radiating 3, 3½ amps. on 200 meters. First $75 takes complete set, equipped for both damped and undamped waves. Details given upon request. Roy C. Ehrhardt, 820 Monroe Ave., Scranton, Pa.

FOR SALE OR EXCHANGE—I have a Smith motor wheel—only three months old, perfect condition—which I will sell or exchange for high grade receiving apparatus. Also fine pair of skates, on No. 6½ skating shoes. All letters considered. H. W. Toomey, Box No. 127, Deer Lodge, Montana.

FOR SALE — What am I offered for a $30.00 wireless receiving set, special make of Doron Bros., mounted on a formica base, cabinet style? Can hear NAA, NAR, NAS, NAW and many other stations. Can hear NAA ten feet from phones with an 80 ft. aerial, 30 ft. high.

Write for particulars, enclosing stamp. Wood Patton, Insco Bldg., Dayton, Ohio.

FOR SALE OR EXCHANGE—One 6" x 8" Electric Photo Printer and ruby light. Complete with a nitrogen and a ruby bulb. Present value, $6.00. What have you? R. G. Devaney, 4624 Winthrop St., Pittsburgh, Pa.

WANTED—A ¼ Kw. transformer, high efficient condensers for sending and a pair of 2,000 ohm receivers. Harry Fas, 34 Grove St., Plainfield, N. J.

FOR SALE OR EXCHANGE—Ten secondary Pies wound with No. 30 enamel wire; fine for spark coil; one panel 10 x 12 of red fibre ¼" thick, for audion cabinet as in October's Everyday Mechanics. All drilled ready for assembly. Erector Motor new. Will trade wire or panel for good variable condenser. A. Willhagen, 444 40th St., Brooklyn, N. Y.

EXCHANGE—Pair of Navy type phones (official) for Radio Apparatus Company's loose coupler. Also pair old style Holtzer-Cabot phones for Mignon coupler or variable condenser. Also have other instruments. S. Cohen, 238 Metropolitan Ave., Brooklyn, N. Y.

FOR SALE—½ Kw. Packard transformer, cost $15.00; one 4,000 to 9,000 r.p.m. rotary gap, cost $15.00; one ¾ Kw. capacity oscillation transformer, pancake type, cost $4.00; oil immersed condenser, cost $5.00; one 13" Tesla coil, cost $5.00 to make it; one three pole double throw antenna switch, cost $2.00; one kick-back preventer. All goods are in first-class condition and cost $46.00. Will sell for $34.00. Farrel Young, 422 So. 2nd Ave., Pocatello, Idaho.

FOR SALE—The three inch Bunnell spark coil that I have been using for long distance communications. Has a range of 75 miles in connection with suitable apparatus. In first-class shape. First $8.00 takes it. Also have a 20 amp. switchboard battery ammeter I will sell for $1.25. E. H. Hartnell, Salem, Wis.

FOR SALE—A pair of excellent 2,000 ohm phones, cost $6.75 for $3.50. Also $10.00 Mysto Erector for $4.00 and Brownie No. 2 camera, new, $1.50. A Runk, 1045 Park Ave., New York city.

EXCHANGE—1" Bulldog spark coil (good condition), small Bunnell key, and Murdock antenna series condenser (never used), for three or four sections Murdock moulded transmitting condensers. W. T. Gravely, Danville, Va.

FOR SALE—New Marconi jar condenser in excellent condition for sale cheap. Never used. Harry S. Weber, 1113 North Walnut St., Canal Dover, Ohio.

FOR SALE—½ Kw. rotary quenched spark transmitting set complete with key, quenched gap, motor, transformer and oscillation transformer, $30.00. 15 record Omnigraph nearly new $10.00. Compressed air spark gap, $5.00. Six inch A. C. or D. C. 110 v. fan, $3.00. Frank G. Beck, 119 N. Pennsylvania Ave., Greensburg, Pa.

FOR SALE—Have no further use for my fine pair of 2,000 ohm wireless receivers. Good condition, sensitive, comfortable. Complete with double head-band and good silk cord, $2.00. Wm. F. Justus, 273 S. Monroe Ave., Columbus, Ohio.

FOR SALE AND EXCHANGE—Brand new 2 step Multi-Audi-Fone, cost $75.00; two single step Multi-Audi-Fones (new), $23.00 each; one Multum in Parvo set (new) with Crystaloi Type BB supersensitive, cost $20.00; want Baldwin amplifying phones, L. C. Smith typewriter, Grebe short wave regenerative receiver, Mesco multilayed coils, DeForest type OJ telephone transmitter, DeForest audion amplifier, single step type EJ1, or Type PJ1, or combination audion detector and single step audion amplifier, or brand new lathe with all accessories, chucks, etc. All letters answered, enclosing two-cent stamp. 241 N. Wilton St., W. Philadelphia, Pa.

FOR SALE—Have for sale a pair of 2,000 ohm H. C. phones; Duck's compressed air

gap; two galena detectors, Massie aerial switch; Halcun rotary gap, and a Helix. M. Winglemire, Holly, Mich.

FOR SALE—One dynamo motor, $2.50 (cost $4.50). Mecanno set, No. 3, $4.00 (cost $6.00). Cash for one-inch coil or will consider a one, or two-inch coil in exchange for above articles. All articles in A1 condition. All answered. George S. Jordan, Mexico, Oswego Co., N. Y.

FOR SALE—Tye T audion tube with cabinet, controls and condenser, $6.50. One No. 366 Murdock variable condenser, $3.00. About 600 ft. seven strand phosphor-bronze aerial wire, with heavy phosphor-bronze lead-in, and insulators, $4.50. All in first class condition. W. T. Cook, 460 West Main St., Norwich, Conn.

FOR SALE—One pair of Brandes Navy type phones, 3,200 ohms, in fine condition. Sent postpaid for $7.50. Edwin L. Powell, 216 Spruce Ave., Takoma, Park, Md.

FOR SALE—Arnold Navy loose coupler, $11.00; one pair Brandes phones, $3.00; 2 Murdock loading coils, $1.50 each; one Blitzen fixed condenser, 75c.; one Blitzen wave meter, $4.00; one Blitzen variable condenser, $3.00 ; one Clapp-Eastham new type ferron detector, $2.00. H. Allen, 784A Hancock St., Brooklyn, N. Y.

FOR SALE OR EXCHANGE—Clapp-Eastham ¼ Kw. condenser; one inch and three inch spark coil; E. I. Co. Transatlantic phones, new; 100-5" x 7" and 3" x 5" photographic plates; 400 ft., No. 8, 100 ft. No. 6 and 10 single braid R. C. wire; moving picture machine, cost $11.00; complete mechanical train outfit consisting of 40 sections of track, station, signals and eight extra cars. Everything guaranteed fine condition and cheap. Have many other wireless instruments. What have you and what are your needs? H. D. Schedler, 244 Palisade Ave., Town of Union, N. J.

Queries Department. Continued from page 42

case according to your sketch.

Wm. B. Potter, Ohio.

1—Give dimensions for a glass plate condenser for a 2" spark coil, gap and helix, with an antenna 90 feet long and 50 feet high with a lead in of 25 feet.

4x5 photographic plates with tinfoil. COAT TWO OR THREE.

2—Must the lead in of my antenna be of insulated wire? No, but it should be well insulated at its supports.

3—Why do signals from Arlington come in loud one minute and weak the next?

It may be due to poor connections in your apparatus or antenna, or due to poor insulation of your antenna. On the other hand it may be due to a changing adjustment of your detector or varying atmospheric conditions over which you have no control.

4—Would an old well make a good transmitting and receiving ground?

Yes, providing there is water in the well, and a fair sized metallic plate is connected to the end of your ground wire.

5—What are the dimensions of a tuning coil which will tune up to 4,000 meters?

Primary 5¼" dia. wound No. 26 D.CCC. Secondary 4 ⅝" dia. wound No. 28 SSCC. Shunt secondary with variable condenser. This will give you a range of 6,000 meters by the use of additional loading inductance in the antenna.

6—How many dry batteries should I use with a two-inch spark coil?

Eight to ten. Hook twice that number in series-multiple if available.

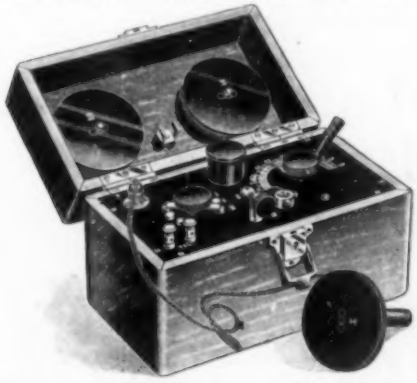
A Wave Meter Contest

MORE than one promising Radio Club wants a wave meter, but due to lack of money, it has never been bought. QST comes forward to create an opportunity for these Clubs. We will furnish the wave meter, if you will return a little vigorous work. The scheme is this:—We will give the wave meter shown in the illustration to the first Club which comes forward with one hundred paid yearly subscriptions to QST. As an extra reward, we will give a pair of first class head phones to the member of the Club who gets the greatest number of subscriptions for his Club.

This gives everyone a chance. Start in right now. The first Club which gets one hundred subscriptions gets the wave meter. Every other Club which also gets one hundred subscriptions during the two weeks following the first award, also gets a similar wave meter. Everyone has an equal chance, not only to earn for their Club a wave meter, but also to get for himself a pair of good phones.

There are no complicated conditions. Nothing but a little "Pep" is necessary. Get in the game today. Your Club wants one. It's the best wave meter we can find.

THE GREBE WAVE METER AWARDED TO THE FIRST CLUB SECURING 100 YEARLY QST SUBSCRIPTIONS



This instrument sells at $70.00. It is designed to work accurately on both long and short waves. It will measure up to 5,000 meters, and contains a high note, high resistance buzzer, in a sound proof rubber case, mounted in a rubber panel. All the printing on this instrument is engraved in the rubber and filled in with white composition. The coils are made of 100 strand Litzendraht wire which gives it an exceptionally low decrement.

MURDOCK "FIFTY-FIVE" PHONES GIVEN TO THE LEADER IN THE CLUB EFFORT

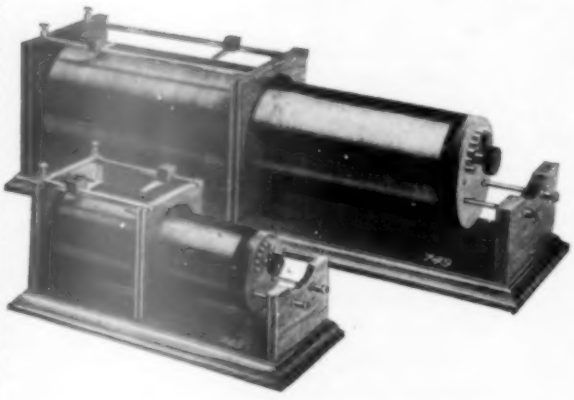
These 'phones have a resistance of 3,000 ohms and are leaders on the market. They are so well known that little need be said about them. A pair of 'phones anyone will be glad to own. Become the leader in your club so you can get them.

Write for subscription blanks.

WAVE METER CONTEST,
The QST Publishing Co.,
Hartford, Conn.

New Undamped Wave Coupler, No. 749

Special Introductory Price, $18.00



Our new Coupler No. 749 is 32 in. long, 9 in. wide and 10 in. high over all, and on the average sized antenna tunes up to 15,000 meters. This Coupler, used with the new CHAMBERS' SYSTEM OR CIRCUIT will bring in signals from domestic and foreign Arc Stations surprisingly loud and clear. Note the difference in size of our No. 748 and the new No. 749.

We claim to be the original inventors of a SYSTEM or CIRCUIT, for the reception of the undamped waves without the use of Loading Coils or Oscillating Coils, as they are sometimes called; as with our system or circuit only two inductively coupled coils are necessary. Circuit supplied with each coupler.

This CHAMBERS' CIRCUIT saves you money. Think of it! No extra coils to pay for, and price of coupler only $18.00.

Place order now so as to be in on the introductory price. Orders filled in rotation. Send for descriptive matter.

F. B. CHAMBERS & CO.

2046 Arch Street
Philadelphia, Pennsylvania

Announcing the DeForest Tubular Audion Bulb

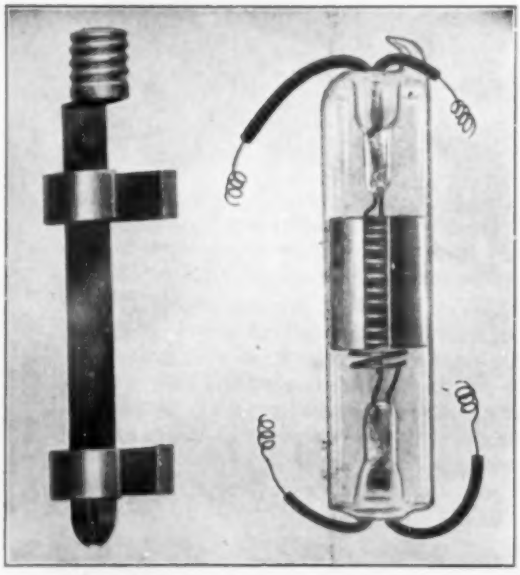
"There is only one Audion-the De Forest"

The New Type T Tubular Audion Bulb gives very loud signals from powerful stations It has a large cylindrical plate, a spiral grid and only one filament of tungsten. As this is a long straight-line filament, it has a long life. Edison effects are completely eliminated. The plate is in contact with the heavy glass tube, preventing overheating.

Sold Separately, $5.50 each

The special adapter fits this type to the screw base receptacles of De Forest apparatus, and is furnished at 40 cents extra.

Send stamp for Bulletins D16 and B16



The Wireless Mfg. Co.
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OUR QST

What Is Said About It.

Gentlemen:—

Enclosed find $1.00 for another year's subscription to QST. The last three numbers have been very fine, the articles by Mr. Godley alone being worth the price of a year's subscription.

C. S. Fritschel, Clinton, Iowa.

Gentlemen:—

Enclosed herewith please find check for one dollar and fifty cents for which kindly enter my name on your subscription lists and send me the back numbers for March, April, May, August and September, which I had the hard luck to miss. It might interest you to know that I secured the June and July numbers at the newstand of the "Continental" while lying at Hong Kong, which certainly is going some.

Robert E. Goll, New York, N. Y.

Million Dollar Wireless Suit.

continued from page 14

and embodying in use the inventions covered."

The Marconi Wireless Telegraph Company of America further claims that the infringement "has resulted in great injury, damage, and loss to your petitioner, in the aggregate sum of $1,000,000, which sum is justly due to your petitioner, and which sum, or such other reasonable compensation as this honorable court may find to be due your petitioner, your petitioner avers it is justly entitled to recover, after allowing all just credits and offsets."

The outcome of this action will be watched with great interest in the electrical and wireless circles throughout the world, as the decision of the Court of Claims will indicate in a certain degree what protection is afforded to inventor, whose patent instruments and apparatus are useful to the United States Government. The law, which promises patent holders to appeal for redress, is comparatively of new date, and the Court of Claims has been established to determine the validity of claims against the United States Government.

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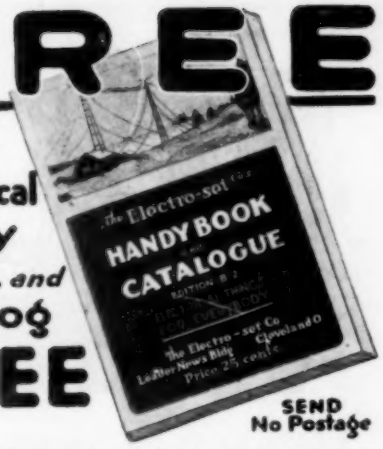

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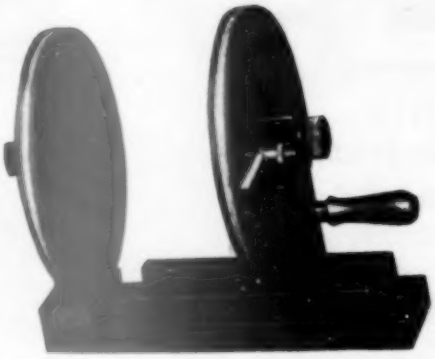

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Do away with the old inductive tuner, taps, sliders and dead end effects. An instrument properly designed, constructed of Bakelite Delecto and wound with Litzendraht. You should have these coils to receive the long distant amateurs working on a 200 meter wave length.

Two cent stamp for bulletin describing exceptional goods.

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SEND 1000 MILES!

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Your transformer is as good as the next one. A high antenna is unnecessary.

Oil condensers, which add 35% to the efficiency, are used in the best stations.

Invest in a "BRECO" Oil Immersed Condenser and work extreme long distance yourself.

$15.00 Variable, for use on 1 K. W. and under. Complete in polished oak case, with switch variation insulated. Only the best quality foil, glass, and transformer oil used. with soldered terminals. Elimination of condenser losses guaranteed.

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A REALITY AT LAST

THE time is now at hand when you can get some startling radio facts from the Pacific Coast. The "Pacific Radio News" is published by the San Francisco Radio Club and the first issue will be ready for distribution on Jan. 1st, 1917. Members of the club have contributed 48 pages of FACTS, some startling stories will be published in the initial issue. The Great Moorhead-DeForest audion tube injunction, together with a full account of the legal proceedings will be the special feature of the first issue. Price per copy is 10 cents, delivery guaranteed. Send for your copy at once as only 10,000 copies are being printed.

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Amateurs Attention!

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The "Midget" No. 1 Fixed Condenser is 2½" x 1½"; "Fiberite" Case with Mahogany or Satin Finish Ends. Nickel Plated Binding Posts, Capacity .0165 M. F. D. Just the thing to use across your phones or in fact for any place you need a fixed condenser.

Price; postpaid anywhere in the U. S. .30

WE ALSO WISH TO ANNOUNCE A RADICAL CHANGE IN POLICY

While we still are representatives of

Electro Importing Co., Adams-Morgan Co., E. T. Turney Co., Brandes, Inc., Stromberg-Carlson Co., Holtzer-Cabot Co., Migon Wireless Corporation, DeForest T. & T. Co., Clapp-Eastham Co., Wm. J. Murdock Co., J. H. Bunnell Co., and Maguire & Shotton.

We will from now on manufacture and sell a line of apparatus of our own. This apparatus will be of the highest grade of material and workmanship and will be known as the "RADICO" apparatus. Every month we will announce a new instrument in this and other electrical magazines.

We will make Easy Terms on Radio Apparatus to Responsible parties. Terms: 25% down, balance in 2 to 10 payments according to size of order.

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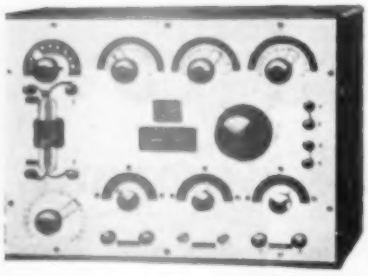

MIGNON UNDAMPED WAVE

Wireless Apparatus

COMMERCIAL and AMATEUR USE

THIS latest Mignon invention is entering a new field in Radio Engineering, eliminating the so familiar Loose Couplers and Loading Coils. These late types introduce adjustable special metal disc cores, heretofore considered absolutely impossible. These new undamped wave receivers are the most efficient apparatus constructed at the present time. The circuits are new. The most important features are the rigid Triple Coils and the relative position of same. All Arc Stations including European, come in sharp and clear, and will positively not be affected by the nearness of the operator's hand or body. The tuning is surprisingly simple and any child will learn to bring in signals with extreme ease. (Instructions accompany each cabinet.)

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Elmira, N. Y., U. S. A.

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MIGNON SYSTEM
RADIO
APPARATUS

LENZITE WIRELESS DETECTOR

Patented May 2, 1916

TRADE-MARK

LENZITE

Recognized by leading authorities as the most sensitive and most effective Detector existing. If not satisfied, return same and your money will be refunded.

TO WHOM IT MAY CONCERN:

Following our policy of endorsing ihe manufacturers and dealers advertisements. we wish to state that the Lenzite Detector has been received and tested at our station. We find it satisfactory in all respects. It is sensitive. easy to adjust. and all that is to be desired of a contact crystal detector.

THE AMERICAN RADIO RELAY LEAGUE. Inc.

To this. Mr. Tuska adds this personal remark:

"Lenzite is the best contact crystal detector I have ever tried".

Signed: C. D. TUSKA. Editor QST

PRICE COMPLETE, $5.00

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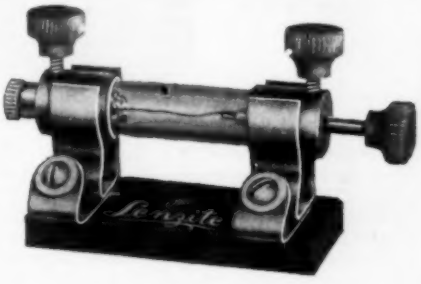
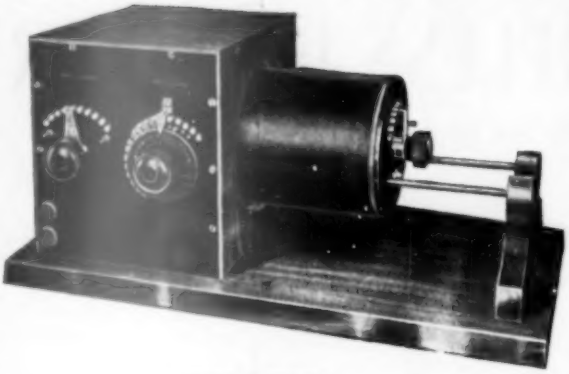


Lenzite Crystal Corporation

537 Chamber of Commerce Bldg., Pasadena, California



TYPE X TUNER

REMEMBER--

that while our new catalog X is filled with complete radio instruments of the highest order of excellence, we also carry a complete stock of exceptionally fine electrical fittings, such as switch points, instrument switches, wire (bare, insulated and resistance) dead-end switches, etc. listed in our general catalog. We will gladly mail both books for which we ask the oourtesy of 6c in stamps.

A TUNER of conventional type with many exclusive features for wave lengths up to 3000 meters. Primary dead end switch, plain "units" switch, mahogany and Bakelite throughout, rubber covered binding posts. Complete description in our new catalog X.

CLAPP-EASTHAM COMPANY

140 Main St., Cambridge, Mass.

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DESIGNED BY EXPERTS FOR THE DISCRIMINATING AMATEUR

EFFICIENCY
SELECTIVITY
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SHORT WAVE REGENERATIVE RECEIVER. TYPE AGP 101

Our new type AGP 101 Short Wave Regenerative Receiver is specially designed for long distance relay work on wave lengths of 150 to 400 metres. It embodies all the latest PRACTICAL ideas in regenerative receiver construction which have proven most satisfactory in actual operation at our testing station. Designed primarily for short wave reception, this instrument will also operate very efficiently on wave lengths up to 1000 metres. A blueprint of connections and instructions for operating in conjunction with your audion equipment is supplied with each instrument.

SHORT WAVE REGENERATIVE RECEIVER, TYPE AGP 101, $32.50

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QST will help your club get a $70 wavemeter. A similar chance has never been offered before. It is your official duty to tell your club about it. Turn back to page 47, Inform yourself so you can take up the work at the next meeting. Get this wavemeter.

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QST should be found on one newsstand in every town. Can you buy it in yours? Assist the work and earn the title of "QST Helper" by filling out the enclosed blank.

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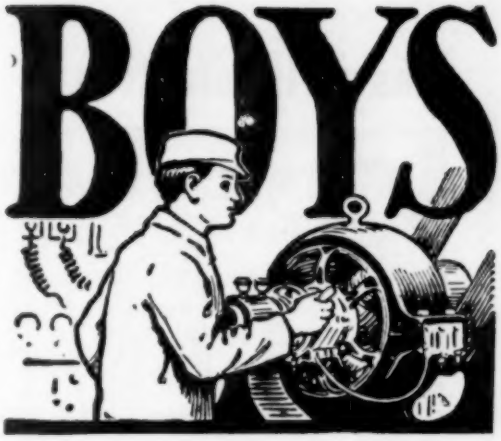

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The discovery and development of new lines (such as wireless telegraphy and telephony), from time to time, promise attractive and paying fields to those who wish to specialize. The *will to do* and *Special Training* will bring success to *you*.

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Explain, without obligating me, how I can qualify for the position, or in the subject, before which I mark X.

☐ ELECTRICAL ENGINEER	☐ CHEMICAL ENGINEER
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☐ Telegraph Expert	☐ DESIGNER
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☐ Mechanical Draftsman	☐ Cert. Public Accountant
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☐ Gas Engineer	☐ Commercial Law
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If it has, you are in luck. You can buy the half-tone and do what a great many amateurs have begun. The scheme is to print a photo on your stationery from the engraving. Then, when you write to a fellow-amateur, he can see just what your station looks like and all about it. It is a fine scheme and to help it we shall place on sale—for the owners—half-tones of stations which appear in QST.

These cost us from a minimum of $1.25 up to $2.50. We shall sell each one, regardless of size, for $1.00. This gives you a chance to save some money and get in on a dandy idea. If your station has enjoyed the honor write today; just enclose a dollar, ask for your half-tone, and it will be sent post-paid by return mail.

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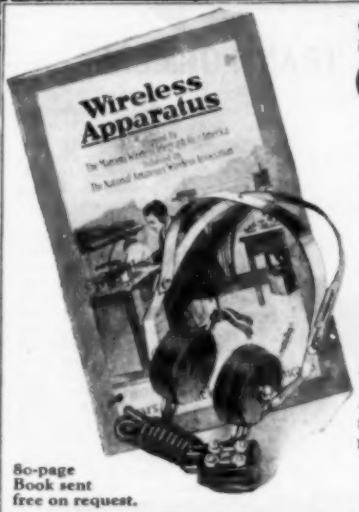

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YOU may have seen several wireless catalogs, but until you own a copy of the 80-page book published by Sears, Roebuck and Co. you have missed one of the finest books of its kind. Printed on high grade paper and illustrated with fine halftones. Filled with money saving bargains in wireless equipment. Every amateur, experimenter, school, university or laboratory needs this book. Write today for your copy. Ask for Wireless Catalog No. 6211Q.

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Many different types of receivers illustrated in this book. We can save you money on these and other wireless needs. All our apparatus is of guaranteed quality and *must* give you satisfaction. If it fails to do so, we refund every penny you may have paid us for it.

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For the Best Results - - Use the Best Instruments

We make and sell only the best. Our sets are sold with a guarantee to tune most efficiently with least trouble. We manufacture short wave sets for relay work. Also undamped sets to hear P. O. Z. clear as a whistle. Send us 4 cents in stamps for descriptive literature and prices. All kinds of repair work done at reasonable rates.

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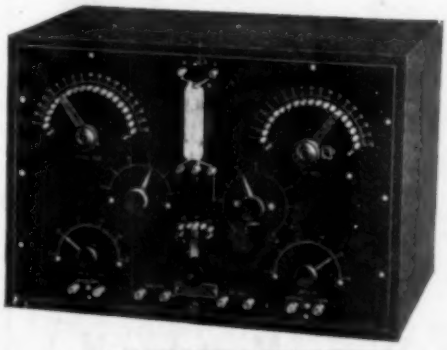

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GERMANY--- ON AN 80 FT. AERIAL

You can read "POZ" (Nauen) and "OUI" (Hanover) daily on our 80 ft. aerial with this

MARVEL OF EFFICIENCY and SIMPLICITY
PRICE 50 per cent. LOWER than others

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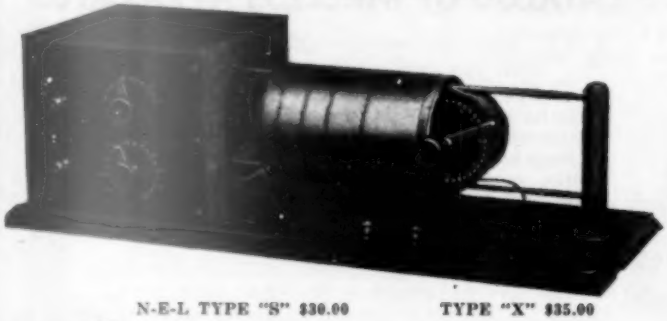
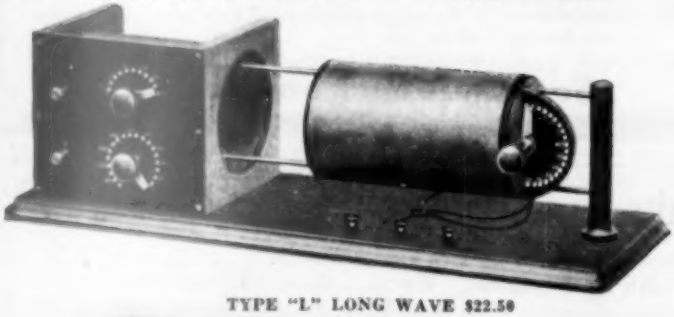
NOTE THAT PEAK

PARAGON WIDE RANGE RECEIVING TRANSFORMERS



N-E-L TYPE "S" $30.00 TYPE "X" $35.00



TYPE "L" LONG WAVE $22.50

NO-END-LOSS "NAVY TYPE" $18.50

Step-up Audion Amplifying Transformer

$12.00

Loading Inductance—Antenna, Secondary and Wing Circuit

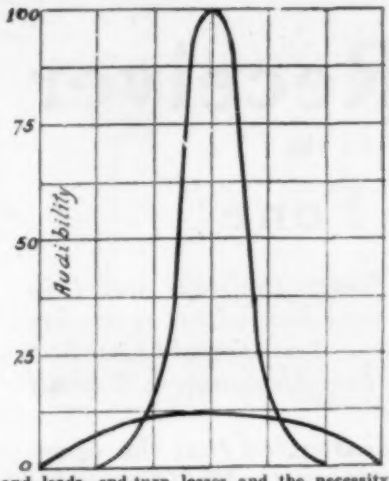
$8.00

The methods we employ in the windings of these instruments eliminate leakage due to coloring matter in the insulation, put an end to the presence of moisture in the varnish, insulation and tube.

The coils of the Paragon **"No-End-Loss"** transformers are divided into sections and fitted with **self-cleaning, positive action** end-turn switches which connect and disconnect the winding as required, **entirely cutting off from the circuit** unused portions of the inductance and **completely eliminating end-turn effects on all wave lengths.** These switches are enclosed and are automatically controlled by the primary and secondary inductance switches respectively.

Panels, housings, switch heads, etc., are of polished black FORMICA, which is superior in every way to hard rubber and costs more. All metal parts are of gold lacquered brass. These instruments are adapted to extremely close tuning and due to the absence of end-losses are particularly recommended as the only receiving transformers on the market suited to the reception of amateur wavelengths or for use in conjunction with the **audion detector.**

Adams-Morgan Co., 16 Alvin Place, Upper Montclair, N. J.



That peak is the resonance curve of the **"PARAGON" RA-6!**

The lower curve represents the response from an ordinary receiver.

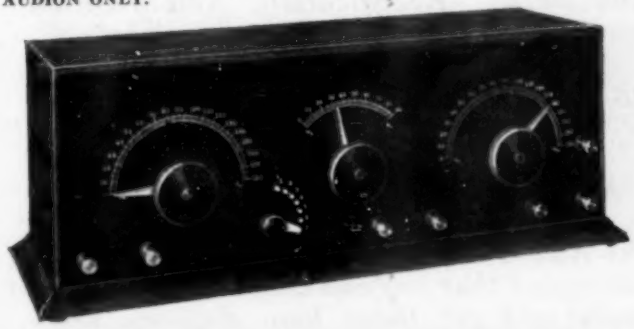
Can you imagine that amplification?—100 times—and the selectivity is just as great comparatively as the amplification! No damping in that peak signal! No interference from other stations on the "same wave"! When you get that peak you are getting everything there is to get from any incoming signal!

How many times have you had a signal fade out—and tried everything under the sun to hold it just one second longer? Study that peak! Note the difference—all the signal strength to spare over the strength of signals on an ordinary set.

How about the stations you have never heard? Stop worrying because the fellow with the big antenna hears them and you don't! That peak will bring them in! The RA-6 will give you that peak.

This instrument is super-efficient, super-selective and super-sensitive. It was designed especially and solely for reception of **AMATEUR-WAVE LENGTHS** and its development has been carried on over a period of two years. It was the FIRST and is the ONLY worthy adaptation of the Regenerative circuits to short-wave reception. The antenna inductance is arranged in steps. **ASIDE FROM THIS THERE ARE NO SWITCHES.** Continuously variable inductances—carefully designed variometers are used in the closed circuits. **HIGH RESISTANCE CONTACTS, the capacity of switch points and leads, end-turn losses and the necessity for a variable tuning capacity are thus ENTIRELY DONE AWAY WITH.**

The antenna and closed circuits are INDUCTIVELY COUPLED and the COUPLING IS VARIABLE. The component parts of the instrument are not crowded into a small cabinet. The fact that ALL of these things are of extreme importance has been proven by the here-to-fore unheard-of **SELECTIVITLY** and **AMPLIFICATION** obtained by owners of this instrument. Signals may be read from stations at extreme distances or through heavy static and interference with this instrument long after other receivers have failed, and WEAK SIGNALS MAY BE AMPLIFIED UP TO ONE HUNDRED TIMES USING ONE AUDION ONLY.



The RA-6, price $35, is as perfect mechanically as it is electrically. It is made right. Everything used in it is the result of long trial and experiment, to make a short-wave set that would give the greatest possible response to any incoming signal, on 180 to 580 meters.

Make that peak work for YOU. Write us **now.**

"PARAGON" RA-6

AMPLIFYING SHORT WAVE RECEIVER

$35.00

Range 180 to 580 Meters

VARIOMETER
Wound for any range
$9.00

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They are in a distinct class by themselves. There are no other instruments which can EQUAL THEM IN ANY WAY—regardless of price. WE CAN PROVE THIS ASSERTION TO THE SATISFACTION OF ANYONE.

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SEND 6c FOR OUR 232 PP. CATALOG

shows several hundred different parts and also sets of materials for building your own apparatus.

Contains complete description and prices of all the latest Wireless and Electrical Goods.

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Has just been perfected by the

Multi-Audi-Fone

The Multiform Receiver is positively the last word in the wireless world. It combines that long looked for receiving set which brings together on a single panel a straight Audion Circuit, the Regenerative Circuit and the Undamped Circuit for the reception of long wave stations.

The Multiform Receiver is so constructed that the operator may instantly pass from 150 meters to 15,000 meters by simply throwing a switch, and he may also at his will cause the bulb to oscillate.

With the use of the Multiform Receiver the three Radio functions of the Audion Bulb --- Rectification, Amplification and Oscillation --- are utilized to their highest possible capacity.

Size 24 in. x 16 in. x 12 in. in mahogany, with Bakelite panel price $100.00.

M. A. F. Short Wave Regenerative Attachment

Our new Multi-Audi-Fone Short Wave Regenerative Attachment is so constructed that you can connect it with your Audion and loose coupler and get those long distance relay messages. Your receiving range will be increased one hundred per cent. on a wave range of 150 to 2,800 meters.

Large coils may be added for the reception of undamped stations.

Our M. A. F. Short Wave Regenerative Attachment is in panel form, built on a genuine Bakelite panel, and the workmanship is of the highest grade throughout.

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Send for Multiform Receiver and Regenerative Attachment Circular

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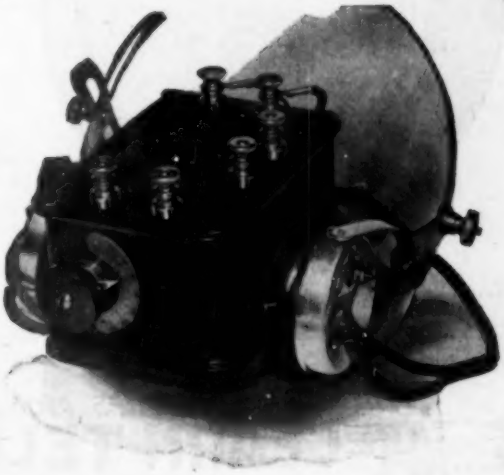
Multi-Audi-Fone

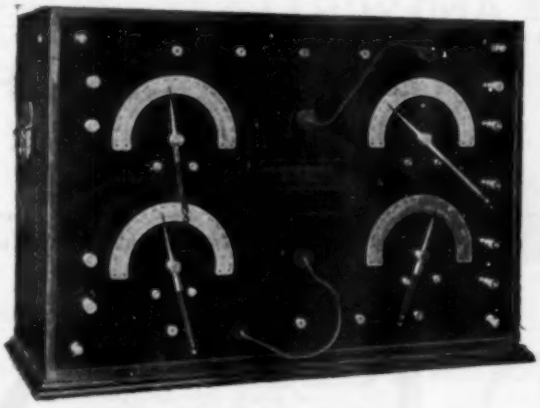
You don't know what Wireless Signals are until you have heard a Two Step M. A. F.

Price, $75.00



If you have ever used a M. A. F. you will never be without one.

Price, $18.00



Do you want to hear those foreign undamped stations? The undamped waver will get them for you. **PRICE, $100.00**

M. A. F. Detector Stand	$4.25
" Fixed Condenser	2.00
Detectorfone	35.00

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Volt and Ampere Meters

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FINISH—Nickel front, with black insulated base
Back connected, long posts

DIMENSIONS—Diameter of base, 3 inches
Depth, 1 1-4 inches

WEIGHT, 5 ounces

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VOLTMETERS	0 to 125 Volts, A. C.,	$8.50
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Maguire & Shotton

ALBANY, NEW YORK

"THERE'S MONEY IN IT"

AT HOME **LEARN TELEGRAPHY** AT HOME

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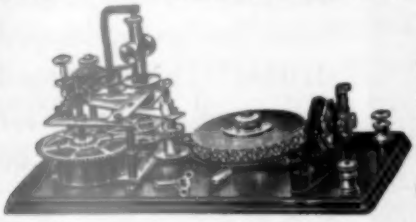

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IT TELLS YOU HOW TO BUILD YOUR OWN APPARATUS

Everyday Mechanics

is the first and only magazine in the world devoted exclusively to constructional "how-to-make and how-to-do" material. It is edited by Thomas Stanley Curtis, whose articles and work you have known since the old days of ELECTRICIAN AND MECHANIC. It contains no war pictures, free write-ups of new devices, general news features. It is solidly and consistently filled, to the last of its ninety-six pages, with practical how-to-make and how-to-do articles.

EVERY FEATURE article that appears in the magazine is prepared from the data obtained in the actual construction and operation of the apparatus described. For every article, a model is constructed in the EVERYDAY MECHANICS EXPERIMENT STATION, Van Nest, N. Y., where it is given a practical working test. This means reliabilty and satisfaction.

EVERY NEW SCIENTIFIC discovery and achievement will be worked out in amateur form in the Experiment Station for the benefit of the readers of EVERYDAY MECHANCS in the future. A model showing the working principles will be described in detail in the magazine so that the serious experimenters of the country may strive to emulate the work done in the experiment station.

THIS MODEL SUBMARINE, CONTROLLED BY WIRELESS; has been described in past issues. The model is 5 ft. long; it is propelled by electric motor; it turns, dives, rises and fires a torpedo which explodes after leaving the boat, all at the will of the wireless operator on shore. Other models, just as ambitious, are in process of design. OTHER FEATURES have been the construction of high frequency apparatus to give gigantic sparks, trans-atlantic radio receiving apparatus, kicking coil apparatus, plant culture paraphernalia, and countless other articles that have delighted the hearts of the serious-minded experimenters of the country and have caused nearly 4000 of them to voluntarily write that EVERYDAY MECHANICS is the best practical magazine bar none, that has ever been published.

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The Moorhead Tube

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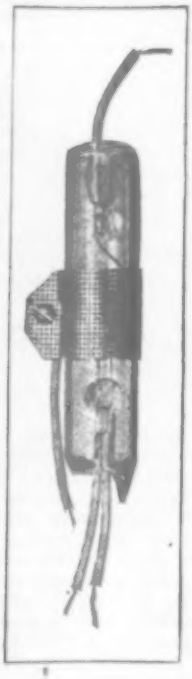

IS your detector perfect? Do you copy the German stations in daylight? Are you receiving signals from enormous distances? Does your detector keep its super-sensitive adjustment? Is it constant month after month? Do you copy the most distant signals through the heaviest strays and static? Is it the MOST SENSITIVE detector you have ever used? IF SO, you must be using the MOORHEAD TUBE. For this detector is guaranteed to do all of the above, and more, too.

It oscillates, it detects, it amplifies. And does all three better than any device you have ever used. Operative in any circuit. Reduces static over 50 per cent., and has a life of over 1200 hours.

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at your fingers' ends

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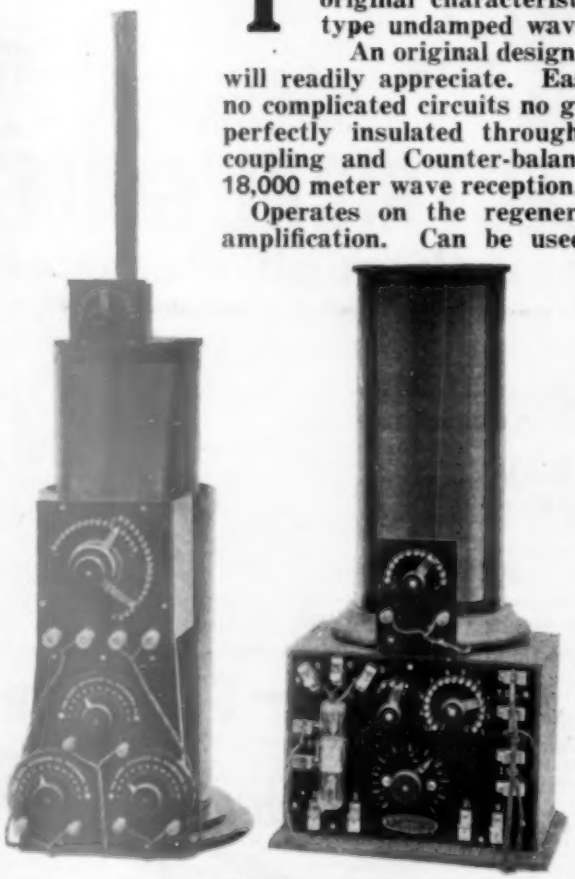

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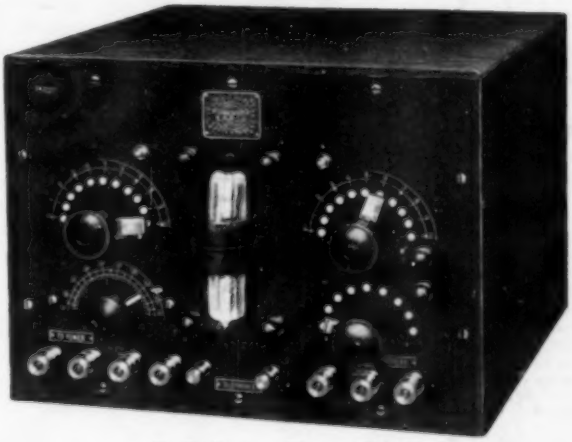

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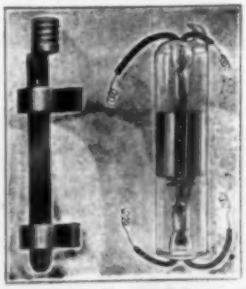

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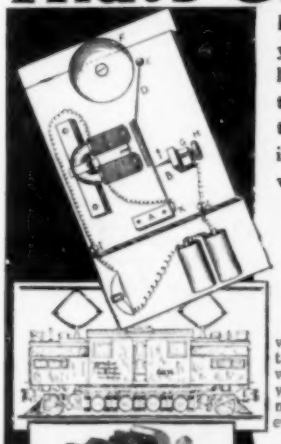

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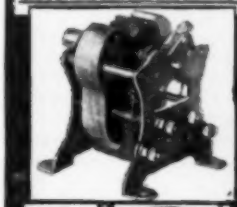

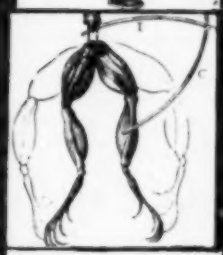

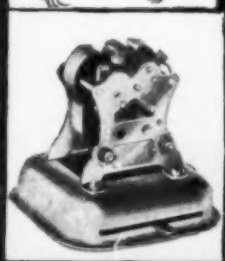

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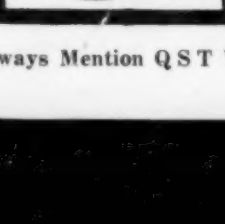

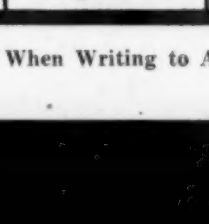

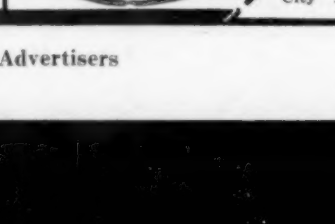

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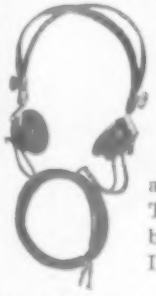

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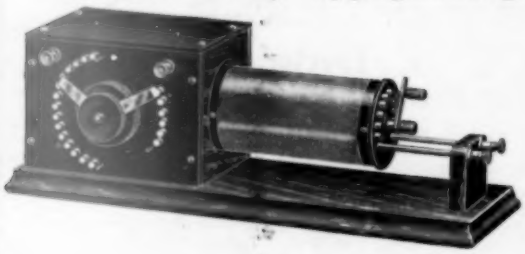

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